Chapter 8
Overview of the Environmental Evidence

MAMMAL AND BIRD BONE *by Lena Strid*

Although a large number of excavations have taken place in Winchester, very few reports from intramural sites have been published. Most comparative material comes from sites in the northern, western and eastern suburbs (Maltby 2010; Serjeantson and Rees 2009).

An assemblage of almost 61,000 fragments (47 kg) was recorded from Northgate House and the Discovery Centre. The bones were recovered by hand and from wet sieving of bulk samples to 0.5 mm. The sieved fragments constituted 50% of the total assemblage by numbers, but only 4.2% of the total fragment weight. A full record of the assemblage, together with a methodology, metrical analyses, full details of pathologies and non-metrical traits, and a longer discussion, can be found in the digital report (*Digital Section 11*) and in the site archive.

The bones were identified using the Oxford Archaeology comparative skeletal collection in addition to standard osteological identification manuals (see *Digital Section 11*).

The presence of residual artefacts and ecofacts is a feature of most urban sites that span centuries of occupation. Many stratigraphically secure post-Roman contexts on the site contained varying amounts of residual Roman pottery. If all contexts containing residual pottery were omitted, many significant deposits would have been excluded. To provide large enough groups to validate statistical analyses, while making a reasonable effort to exclude residual bones, the following strategy was adopted: all contexts containing 10% or fewer sherds of residual pottery would be analysed, as well as contexts containing fewer than 5 sherds of pottery and stratigraphically secure contexts with no pottery. Exceptions were made for two contexts (NH5168, NH5202), which comprised the base and third fills of pit NH5169, as the three other fills from this pit contained several foot bones of squirrel, suggesting furrier activity.

All medieval contexts from the Discovery Centre were analysed according to the above strategy, but only partial analysis of the assessed medieval context groups from Northgate House was undertaken.

The assemblage

Bones were recorded from four main phases: Phase 2 (Roman), Phase 4 (late Saxon), Phase 5 (Anglo-Norman) and Phase 6 (medieval). The late Saxon and Anglo-Norman assemblages were by far the most numerous (Table 8.1).

Preservation ranged generally from good to fair, providing ample opportunities for observation of butchering marks and pathologies. Burnt bones were generally scarce. Gnawed bones were slightly more common in the Roman assemblage, although not very numerous. The majority of the bones were gnawed by carnivores, probably dog. Probable cat gnawing marks were seen on a few bones from Phases 4 and 5. Rodent gnawing was observed on a small number of bones in each phase.

Bones from both meat-rich and meat-poor body parts of cattle, sheep/goat and pig were present in every phase group. Specific butchers' streets are documented for Winchester from the 10th century (Hagen 2002, 315). As these streets are not within the excavated site, the inclusion of meat-poor body parts in the assemblages suggests that body parts such as cattle and sheep/goat metapodials and phalanges were either useful in other ways, such as marrow extraction or glue making, or were included in the portioned carcass.

The bird assemblage comprised around 4% of the total 60,595 recorded faunal fragments. About 51% of the bird bones were identified to species/family. Domestic fowl (*Gallus gallus*) is the most common bird, followed by duck (*Anatinae / Aythyinae / Tadorninae / Merginae*) and then goose (*Anser anser / Anser domesticus*). Altogether, 16 species/families are represented: Domestic fowl, goose, brent goose (*Branta bernicla*), duck, mallard (*Anas platyrhynchos*), teal (*Anas crecca*), grey partridge (*Perdix perdix*), pigeon (*Columba* sp.), woodcock (*Scolopax rusticola*), lapwing (*Vanellus vanellus*), snipe (*Gallinago gallinago*), kittiwake (*Rissa tridactyla*), cormorant (*Phalacrocorax carbo*), jackdaw (*Corvus monedula*), crane (*Grus grus*) and buzzard (*Buteo buteo*).

The Roman assemblage

The recorded Roman assemblage consisted of 8016 fragments, of which 1755 (21.9%) were identified to taxon. Viewing the Roman mammal assemblage as a whole, the most numerous species, based on the number of identified fragments per species (NISP) is cattle, whereas sheep/goat has the largest number of individuals, based on the calculation of minimum number of individuals (MNI)

Table 8.1. Number of identified bones (NISP) /taxon by chronological phase in the Northgate House and Discovery Centre assemblage

	Phase 1	*Phase 2*	*Phase 2.1*	*Phase 2.2*	*Phase 2.3*	*Phase 2.4*	*Phase 4*	*Phase 4.1*	*Phase 4.2*	*Phase 5*	*Phase 6*	*TOTAL*
Cattle	9	754	96	15	385	268	914	226	688	1420	223	3330
Sheep/goat	28	593	140	5	253	195	1230	214	1016	2248	358	4457
Sheep	1	43	11		18	14	149	43	106	595	45	833
Goat		3			3		37	6	31	91	6	137
Pig	8	250	25	3	144	78	592	139	453	719	155	1724
Horse	1	26	3	2	8	13	41	12	29	133	6	207
Red deer		6			2	4	2		2	4		12
Roe deer							2		2	5		7
Deer sp.		2			2		7	2	5	7	2	18
Dog		16			14	2	17	1	16	23	3	59
Cat							14		14	498	7	519
Hare							2		2	6	9	17
Lagomorph										1		1
Fox										8		8
Badger							1		1			1
Pine marten?							1		1			1
Stoat										6		6
Ferret/Polecat										9		9
Small mustelid										3		3
Squirrel										308	1	309
Rat		1			1		6		6	5		12
House mouse		1			1							1
Wood mouse		1			1							1
Mouse sp.		6			6		2		2	3		11
Bank/field vole	1	3			2	1				4	2	10
Shrew		1			1							1
Rodent		2	1		1		3	1	2	5	1	11
Frog	7	2			1	1	20		20	10	4	43
Toad							26		26	1	1	28
Amphibian	1	8	2		5	1	31		31	19	5	64
Fowl	9	33		3	16	14	384	38	346	317	64	807
Goose		1			1		9	3	6	44	18	72
Brent goose										1		1
Duck		9			6	3	22	1	21	36	5	72
Domestic duck										1		1
Mallard		1				1	2		2			3
Teal							1	1		3		4
Pigeon		1			1					5	1	7
Partridge										1		1
Crane										1		1
Snipe										1	2	3
Woodcock							1		1	1	1	2
Wader										2		2
Kittiwake							2		2			2
Comorant		1				1						1
Buzzard										1		1
Jackdaw										5		5
Corvid										2		2
Passerine							4		4	16	5	25
Bird sp.	5	28	3		14	11	325	37	288	574	340	1272
Microfauna							2		2	3		5
Micromammal		26			26		3	2	1	44	3	76
Small mammal		14	6	1	1	6	55	9	46	428	18	515
Medium mammal	29	709	210	10	306	183	2100	371	1729	2821	447	6106
Large mammal	26	1501	555	15	511	420	1619	414	1205	2857	381	6384
Indeterminate	226	3964	1153	47	1286	1478	9530	2716	6814	11892	3517	29138
TOTAL	351	8016	2205	101	3016	2694	17157	4237	12920	25187	5630	56339
Weight (g)	1446	90171	10820	1106	48148	30097	128148	28408	99740	198737	28499	447001

Note: Totals presented in this table exclude general Phase 4 animal bone assemblage, which was excluded from the detailed analysis

Table 8.2. Roman assemblage, Phase 2: Anatomical distribution of all species, including NISP, MNI and weight.
Skeletal element used for MNI is marked with an asterisk.

	Cattle	*Sheep/ goat*	*Sheep*	*Goat*	*Pig*	*Horse*	*Deer sp.*	*Red deer*	*Dog*
Antler							2	6	
Horn core	9		4	3					
Skull	55	26	12		29				2
Mandible	73	80	12		36	3			1
Loose teeth	92	102	2		39	6			
Hyoid	4	7							
Atlas	8	1							
Axis	4	1							1
Vertebrae									4
Ribs						2			2
Sternum									
Sacrum	1	1							
Scapula	29	17			17	1			1
Humerus	66	38			13				1
Radius	51	52			13				2
Ulna	27	14			18*				
Carpals	2	3							
Metacarpal	60*	41	7		12	2			
Pelvis	27	36			15	2			
Femur	54	21			9	2			
Patella		1							
Tibia	39	51*			10	1			
Fibula					10				
Calcaneus	25	4			6	1			
Astragalus	19	3			3				
Tarsals	5	1			1	1			
Metatarsal	45	67	6		11	1			
Phalanx 1	37	11			3	1			
Phalanx 2	8	4			2	1			
Phalanx 3	4	6			1	1			
Lateral metapodial					1				
Indet. metapodial	9	5			1	1			2
Carpal/tarsal									
Sesamoid									
Long bone									
Indeterminate	1								
Total (NISP)	754	593	43	3	250	26	2	6	16
MNI	18	22			7	1		1	1
Weight (g)	43645	5481	942	252	4080	1604	35	129	72

(Table 8.2). When examining the Roman sub-phases, regardless of method, sheep/goat dominate in Phase 2.1 while cattle are dominant in Phases 2.3 and 2.4. Phase 2.2 contained too few bones to carry out such an analysis. This provides some, albeit it fairly limited, evidence suggesting a change in the focus of animal husbandry in the region as a consequence of Romanisation. Although sheep/goat dominated during the foundation of *Venta Belgarum*, cattle, which the Romans favoured over sheep/goat, became more prominent as Roman influence took hold. In the later periods sheep/goat consistently outnumber cattle (Table 8.1), probably because the nearby downs were more suitable for sheep.

Meat-providing domestic mammals

Cattle

Few ageable and sexable cattle bones were recovered from individual sub-phases, so the Roman cattle assemblage was analysed as a unit. Adult cattle dominated the assemblage by all ageing methods; the mandibular wear stages (MWS) correspond closely to those from the Winchester Northern suburbs and the nearby rural settlement Owslebury. The focus on adult cattle as opposed to young adults particularly reflects the importance of cattle as providers of traction for agriculture. If cattle were mainly raised for meat, they would have been slaughtered at a younger age. While a peak of young cattle (MWS:21–25) was observed in the assemblage, this is probably due to the small sample size. There were somewhat fewer senile cattle at Winchester than at Owslebury, which may indicate that older cattle were less attractive for the meat market.

Of the twelve measureable metacarpals (late Roman phase), five were found to be within the range of cows and seven within the range of bulls and oxen (Mennerich 1968, 11f, 35, in Vretemark 1997, 48). This is in contrast to the pelves, where a majority were female.

Several cattle bones in all four sub-phases had been butchered. Cut marks resulting from skinning occurred on five first phalanges and around one horn core. Several long bones were axially split, presumably for marrow extraction. Chop marks associated with dismemberment were also recorded. These occurred proximally, mid-shaft and distally on long bones, as well as on pelvis (ilium), axis and the articular process of the mandible. Knife cuts suggesting dismemberment were found distally on the humerus and metacarpal, and proximally on the femur. Filleting cuts occurred on the pelvis (ilium), femur, scapula, hyoid, mandibular ramus and the skull (zygomatic).

Pathological conditions were found on 16 cattle bones, mostly on bones from the lower legs and feet. Details of these, and of non-metrical traits, are provided in the digital report (*Digital Section 11*).

Sheep/goat

Of the 639 sheep/goat bones, 43 could be identified as sheep and three (horn cores from Phase 2.3) as goat, so it is likely that the majority of the sheep/goat bones in the assemblage were sheep (cf. Maltby 1981, 159–160).

The sheep/goats appear to have been steadily culled throughout the first few years, with a small peak in culling at 1–2 years . When dividing the assemblage into sub-phases, the slaughter pattern shows a focus on 4–6 year olds in Phase 2.3 and 1–2 year olds in Phase 2.4. Almost 55% of the late fusing bones are unfused, so representing sheep/goats of less than 3–3.5 years of age. This slaughter age pattern is similar to that at Owslebury and the Roman suburbs (Maltby 1994; Maltby 2010) showing a cull of young sheep for meat, probably in their second autumn, and a later cull of adult sheep after they had yielded a few years' worth of milk, wool, dung and offspring.

The sheep/goat remains which could be attributed to males or females included pelves and horn cores. The derived ratio of males to females varied, however, depending on which element was used for the sex estimation: the pelves were mainly female, while the horn cores were mainly male. While skulls of hornless ewes can skew a horn core assemblage towards a male majority, no hornless skulls were found in the assemblage. The measurable sheep bones are within the same size range as sheep bones from other Roman sites in Britain (ABMAP).

Butchery marks were observed on 31 sheep/goat bones. Cut-marks associated with skinning were found at the proximal end of eight metapodials and the distal end of two metapodials. Limb bone butchery was limited to one radius, two pelves, two femora and 13 metapodials. The radii, femora and pelves had cut marks indicative of filleting. The butchery marks on the metapodials were more varied. These included skinning cut marks at the proximal and distal ends and axial splitting for marrow extraction. Cut-marks on skulls, mandibles and hyoid resulted from severing the head, disarticulating the mandible from the skull and possibly removal of the tongue. Both sheep and goat horn cores had been chopped from the skulls, suggesting the inclusion of tanners' or horn workers' waste. The contexts containing goat horn cores (NH2610, NH9543, CC1697) consist of mixed butchery and kitchen waste, which would suggest that the horn cores represent small scale craft activity rather than intensive industrial waste.

Six sheep/goat bones displayed pathological conditions. Congenital traits were found on 19 mandibles and two skulls.

Pig

The pig dental eruption and attrition data show that juvenile, immature and sub-adult pigs were slaughtered. The bone fusion is consistent with the dental age estimation and with the data from the Northern Suburbs (Maltby 2010). A pig's only economic value lies in their meat and fat, so there is no reason to keep more than the necessary breeding animals alive once they have reached their full growth. Their high fecundity and growth rate enables routine slaughter of immature individuals.

There was a considerable bias in favour of boars. A predominance of boar is common in most Roman assemblages in Britain and north-western continental Europe (Luff 1982, 263) and has been interpreted as the slaughter of surplus young boars (Johnstone and Albarella 2002, 31). Bengt Wigh (2001, 80) further extrapolates, writing that as sows yield less meat than boars, surplus sows would be slaughtered early, before the eruption of the permanent canines at 6–9 months.

The axial splitting of long bones, which is very common for Roman cattle butchery, was virtually non-existent for pig. Pig butchery was mainly carried out with cleavers, dismembering the carcass at the joints. Evidence for portioning was found on three pelves, where the ilium had been chopped away. Filleting cut marks occurred on a mandible indicating the utilisation of cheek meat, whereas cut marks indicating filleting or dismemberment were observed on a distal fibula and on a metatarsal. Instead of being split axially, a tibia had been broken open mid-shaft for marrow extraction.

The only pig bone with a pathology in the assemblage was a maxillary canine, whose root was deformed by exostoses. This is believed to be a result of a chronic infection (Baker and Brothwell 1980, 150–1).

Other domestic mammals

Horse

The majority of the horse bones are from adult horses, which is consistent with other Romano-British sites (Locker 1990, 208; Johnstone and Albarella 2002, 34; Maltby 1993, 329–30; Luff 1999, 205). In contrast to the northern suburbs, no articulated remains were found. This may be related to regulations concerning the disposal of horse carcasses in intra-mural and extra-mural areas (Maltby 2010). The proximal end of one tibia from Phase 2.3 was unfused, indicating a horse of less than 3.5 years of age at death. Due to fragmentation, withers' heights could not be calculated. Butchering marks were not observed.

Dog

The dog remains comprise one semi-articulated puppy in Phase 2.3. and two disarticulated sub-adult or adult bones each from Phases 2.3 and 2.4. As the bones were fragmented, withers' heights could not be calculated. While dogs have been used in ritual deposits in wells and other features on Roman sites (Maltby 2010; Fulford 2001, 215), the puppy's placement in a secondary fill of a cess pit may suggest deliberate killing in order to control the dog population.

Wild mammals

Wild mammals in the Roman assemblage include deer, rodents, insectivores and amphibians. The deer remains (Phase 2.3) consisted of two antler tine fragments from either red deer or fallow deer. While the Romans introduced a small number of fallow deer to Britain, they were kept in game parks or similar enclosures, probably near the owners' villas (Sykes *et al*. 2006, 953–4). The two fragments of deer antler are therefore likely to be from the native red deer. The scarcity of wild fauna in the assemblage is consistent with contemporary sites in Britain and continental Europe (Luff 1982, 268–83), indicating that hunted game provided an insignificant part of the diet.

The presence of amphibians and voles suggest that areas adjacent to that excavated included wetlands and open grassland. The voles and wood mice may have been killed by cats and transported some distance. House mice on the other hand are a commensal species and would have lived in close contact with people.

Birds

Relatively few bird bones were recovered. Fowl dominate, with duck (*Anatidae, Anas plathyrhynchos*) the second most common bird. The dominance of duck over goose has been observed at other Roman sites. However, archaeological, documentary and pictorial evidence suggest that duck and goose husbandry in Britain was not fully developed during the Roman period (Albarella 2005) so the majority of the ducks and geese in the Winchester assemblage were probably wild birds; all the ducks and geese were adult. Despite the absence of butchering marks, it is assumed that they were eaten. Secondary products such as eggs and feathers were undoubtedly also utilised.

The number of fowl remains is very low when compared to data from other Romano-British towns, although at a similar level to suburban Winchester sites (Maltby 2010). While retrieval methods and taphonomic differences may play a part, it suggests that poultry were not commonly kept in the town, and those which were kept may have been primarily valued for their eggs. Most fowl were adults, or subadults; only a few juveniles were present. One tibiotarsus had cut marks on the distal condyles, indicating disarticulation of the foot prior to cooking.

Pigeon is found on many Roman sites, although normally only present in small numbers. It is uncertain whether the pigeon bone recovered from Phase 2.3 was from the stock dove (*Columba oenas*) or rock pigeon (*Columba livia*) as these species are of similar size. Dovecotes were usually placed on the roof, according to Roman authors (Rivet 1982, 207), and would thus elude archaeological discovery.

Cormorant bones, as well as bones from other sea birds, are very rare on Romano-British sites, so the carpometacarpus from late Roman Dark Earth context NH4718 is an unusual find. No sea birds are mentioned in Parker's 1988 study of birds from Romano-British sites (Parker 1988, 210–3), although one cormorant bone was retrieved from the Roman settlement Halangy Down at the Scilly Isles (Locker 1996). Cormorants are normally associated with coastal areas, but may live at inland marshes and lakes, and often move inland in winter (Cramp 1980, 202). The paucity of cormorant and other sea birds suggests that they were generally not considered suitable for eating by the Romano-British population.

The late Saxon assemblage

The late Saxon assemblage could be divided into two sub-phases: Phase 4.1 and Phase 4.2, comprising a total of 4237 and 12920 fragments respectively. A further 4597 animal remains derived from contexts that could not be dated to either phase, and were therefore excluded from the detailed analysis. However, noteworthy bones from contexts dated only to Phase 4 have been included for discussion where appropriate.

Approximately 16% and 22% of the late Saxon faunal remains in the two sub-phases could be identified to species (see Table 8.1). Of the 1230 sheep/goat bones, 149 could be identified as sheep and 37 as goat. The goat remains comprise horn cores and a few metapodials. They are found in a variety of properties, and since only five of the horn cores have butchery marks it suggests that horn working was a small-scale craft in this part of the town.

In both Phases 4.1 and 4.2 sheep/goat is the most numerous taxa regardless of quantification method (Tables 8.3 and 8.4). This contrasts both with other

Table 8.3. Late Saxon assemblage, Phase 4.1: Anatomical distribution of all species, including NISP, MNI and weight. *Skeletal element used for MNI is marked with an asterisk*

	Cattle	*Sheep/ goat*	*Sheep*	*Goat*	*Pig*	*Horse*	*Deer sp.*	*Red deer*	*Roe deer*	*Dog*
Antler							2	1		
Horn core	25	8	22	25						
Skull	66	79	39	3	58	1				2
Mandible	54	120	6		38	5				4
Loose teeth	58	92	1		36	7				
Hyoid	1	2								
Atlas	12	8			11					1
Axis	9	20			1				1	1
Vertebrae		1								
Pygostyle										
Urostyle										
Ribs										
Sternum										
Neck cartilage										
Sacrum	5									
Synsacrum										
Furcula										
Coracoid										
Scapula	23	41			11	3*	2*			
Humerus	54*	57			23	1			1	2*
Radius	45	90			24*	1				1
Ulna	23	33			25	1	1			1
Radioulna										
Carpals	15	6			1					
Metacarpal	29	82	15	3	38	2		1		
Carpometacarpus										
Pelvis	46	61			28	1				
Femur	45	24			22	1				1
Patella		2								
Tibia	38	112*	1		32					
Fibula					11					
Tibiotarsus										
Tibiofibula										
Calcaneus	15	14			6	1				
Astragalus	11	6			1	1				
Tarsals	9	6			2					
Metatarsal	45	70	21		42	1				3
Tarsometatarsus										
Phalanx 1	26	35			16	2				
Phalanx 2	17	18			7					
Phalanx 3	14	11			6	1				
Indet. Phalanx		1								
Lateral metapodial					8					
Indet. metapodial	3	17	1		6					
Sesamoid										
Indet. lateral phalanx										
Carpal/tarsal										
Long bone										
Indeterminate										
Total (NISP)	688	1016	106	31	453	29	5	2	2	16
MNI	18	49			16	2	2	1	1	2
Weight (g)	39387	11505	2952	2525	5976	2472	149	136	44	127

Table 8.4. Late Saxon assemblage, Phase 4.2: Anatomical distribution of all species, including NISP, MNI and weight.
Skeletal element used for MNI is marked with an asterisk

	Cattle	*Sheep/ goat*	*Sheep*	*Goat*	*Pig*	*Horse*	*Deer sp.*	*Red deer*	*Roe deer*	*Dog*	*Cat*	*Hare*	*Badger*	*Pine marten?*
Antler							2	1						
Horn core	25	8	22	25										
Skull	66	79	39	3	58	1				2				
Mandible	54	120	6		38	5				4				
Loose teeth	58	92	1		36	7					1			
Hyoid	1	2												
Atlas	12	8			11					1				
Axis	9	20			1				1	1				
Vertebrae		1												
Pygostyle														
Urostyle														
Ribs														
Sternum														
Neck cartilage														
Sacrum	5													
Synsacrum														
Furcula														
Coracoid														
Scapula	23	41			11	3*	2*							
Humerus	54*	57			23	1			1	2*	1	1	1	
Radius	45	90			24*	1				1				
Ulna	23	33			25	1	1			1	1			
Radioulna														
Carpals	15	6			1									
Metacarpal	29	82	15	3	38	2		1						
Carpometacarpus														
Pelvis	46	61			28	1					3*			
Femur	45	24			22	1				1				
Patella		2												
Tibia	38	112*	1		32						1	1		
Fibula					11									
Tibiotarsus														
Tibiofibula														
Calcaneus	15	14			6	1								
Astragalus	11	6			1	1								
Tarsals	9	6			2									
Metatarsal	45	70	21		42	1				3	2			1
Tarsometatarsus														
Phalanx 1	26	35			16	2					1			
Phalanx 2	17	18			7									
Phalanx 3	14	11			6	1					4			
Indet. Phalanx		1												
Lateral metapodial					8									
Indet. metapodial	3	17	1		6									
Sesamoid														
Indet. lateral phalanx														
Carpal/tarsal														
Long bone														
Indeterminate														
Total (NISP)	688	1016	106	31	453	29	5	2	2	16	14	2	1	1
MNI	18	49			16	2	2	1	1	2	2	1	1	1
Weight (g)	39387	11505	2952	2525	5976	2472	149	136	44	127	19	7	6	< 0

late Saxon assemblages from Winchester (Bourdillon 2009; Coy 2009) and with mid Saxon assemblages from Southampton (Bourdillon and Coy 1980; Bourdillon and Andrews 1997), where cattle were the most numerous domesticate. Although the relative proportion of sheep/goat bones can be artificially skewed by the recovery of either large craft waste deposits of metapodials and horn cores, or of articulated skeletons, neither of these deposit types were encountered in this assemblage. Hence the dominance of sheep/goat probably relates to socio-economic dietary variations between different parts of the town.

When comparing the NISP between the two subphases, the proportion of sheep/goat increases in Phase 4.2 at the expense of cattle and to some extent, pig; however the MNI values are too small to be reliable (Hambleton 1999, 40). Despite its relatively large size, the assemblage from Phase 4.1 also had too few ageable, sexable and measureable bones to facilitate comparisons with Phase 4.2.

Meat providing domestic mammals

Cattle

Two peaks of culling were evident from the dental data from both Phases 4.1 and 4.2: at 18–30 months old and when senile. This suggests that the bovine part of the diet consisted of young cattle raised for meat and old breeding cows or draught oxen past their prime. The age estimation is consistent with the contemporary suburban Winchester assemblages (Bourdillon 2009; Coy 2009), but while the 46+ MWS predominate in the Northgate House/ Discovery Centre assemblage, in the Western suburbs the 41–45 MWS dominate. If this is a true difference, and not skewed by the small sample, it may point towards socio-economic differences between the western suburbs and the north-east intramural area. The peak of sub-adult cattle is confirmed by the fusion data and by horn core age estimation, which, while not a very large sample, is dominated by 2–3 year old cattle.

All lines of evidence (pelvic morphology and metacarpal metrical analysis) from Phase 4.2 indicate that females dominate the assemblage. A predominance of cows is consistent with Maltby's interpretation of Roman rural livestock trade (see discussion above). The dominance of cows is less clear for Phase 4.1, but relatively few pelves were present.

Almost 12% of the cattle bones had been butchered. The tradition of axial splitting of long bones continues in the late Saxon period. A similar frequency of chop marks indicative of dismembering was observed on long bones as well as on mandible and pelvis. Dismembering cut marks were more frequent than in the Roman period, and are rather common on long bone joints, as well as on calcaneus, astragalus and the mandible. Fine cut marks were found on a number of long bones, scapulae and hyoids probably indicative of filleting and tongue removal. Skinning cut marks occurred on the phalanges and at the base of horn cores.

Twenty seven cattle bones (1.3%) displayed evidence of some kind of pathology. The majority were affected by thin bone growth on the surface of the bone, indicating infection. Congenital conditions occurred on one mandibular M3, where the third posterior cusp was missing.

Sheep/goat

The slaughter pattern for sheep/goat in Phase 4.2 is one focussed on 2–6 year old sheep/goats, with a small secondary peak in the 3–4 year range. An apparent preference for older sheep/goats in Phase 4.1 is based on a small number of mandibles and is therefore unreliable. As before, this implies a mixed sheep economy, where some sheep were slaughtered early for meat, whereas others were kept longer for wool, dairy products and breeding. This is very similar to the assemblages from the Northern and Eastern suburbs and the City Defences at Winchester (Serjeantson and Smith 2009, 230–1).

Most sheep were horned: three displayed tiny or rudimentary horn cores, and one sheep in a Phase 4 late Saxon context (NH11559) was hornless. This is consistent with the other Winchester assemblages, where a minority of the sheep were hornless (Bourdillon 2009; Coy 2009) and has been connected to an influence of imported continental hornless breeds in the Roman period, as both sexes in the native British sheep breeds were horned (Maltby 1994, 94). Male sheep/goats dominated the late Saxon assemblages. This may reflect a preference for wool husbandry, since wethers yield better quality wool than ewes and rams. The larger horn cores of rams would have been more suitable for horn working than the smaller, or non-existing, horn cores of ewes.

Evidence for skinning was found on a first phalanx, which had cut marks mid-shaft. Skulls were severed from the rest of the carcass at the axis, and in many cases horn cores were chopped off the skulls. Cut marks for disarticulation occurred on the elbow joint, hip joint and the tarsal joint. Disarticulation/portioning chop marks were found not only at the joints of long bones but also mid-shaft. Other evidence for portioning occurred on a scapula, which was chopped in two mid-blade. Filleting cut marks occurred on the mandible, axis, scapula, humerus, radius, pelvis, femur and tibia. Axial splitting of long bones, in order to extract marrow, only occurred on metapodials. Cut marks on the distal metapodials could either be from skinning or foot removal, possibly in order to boil hooves for glue or rendering them for oil (Serjeantson 1989, 141).

Pathological conditions were recorded on 40 bones, less than 4% of the late Saxon sheep/goat assemblage.

Pig

As for other sites of this period in Winchester, the pig dental age estimation shows a wide distribution of slaughter ages, ranging from juvenile to adult.

This is confirmed by the epiphyseal fusion data: high fecundity enables a quick turnover in livestock. There were no major differences in fusion between Phase 4.1 (n:67) and Phase 4.2 (n:219). A small number of neonatal pig bones were present, which suggests some local pig rearing, probably in backyards. The number of teeth from boars and sows are roughly equivalent, however, suggesting a pig husbandry that was not focussed on optimum meat yields.

Butchery marks indicate that pig carcasses were suspended: both atlas, skull, mandible and pelvis show signs of sagittal splitting. With the exception of the sagittal splits, butchery marks on pig are overwhelmingly carried out with knives rather than cleavers. Nevertheless, a few chop marks (most likely by cleavers) were noted on a distal humerus. Disarticulation by knives was recorded on atlas, distal humerus, proximal radius, proximal ulna and proximal metapodials. Filleting marks were evident to the mandible, scapula, ulna, pelvis, femur and metapodials. This indicates that in addition to the utilisation of the larger muscle masses of the body for meat, the flesh on head and feet were also eaten.

Pathologies were observed on four pig bones from Phase 4.2.

Other domestic mammals

Horse

Consistent with other sites in Winchester, with the exception of the western suburbs (Bourdillon 2009), all horse bones which could be aged belonged to full-grown adult horses. A paucity of young horse bones is typical for urban Saxon assemblages, suggesting that horse breeding would have occurred in the countryside rather than in the cities. Withers' heights of 1.28 m and 1.43 m respectively were calculated from a metacarpal and a metarsal from deposits in Phase 4.1.

Butchery marks occurred on three horse bones from Phase 4.2. Cut marks observed on the mid-shaft of a femur and a pelvis (ischium) are typical of filleting. A radius displayed chop marks on the distal half of the bone, suggesting disarticulation, or possibly rough filleting. While horse was not normally eaten in late Saxon England, horse flesh may have been fed to dogs, a practice which is known from post-medieval sources (Thomas and Locock 2000).

An unarticulated second and third phalanx from Phase 4.2 had ossified muscle attachments, so called enthesophytes, near the joint surfaces. This condition is connected to muscular stress (Roberts and Manchester 1999, 110) and may be related to the use of horses for traction or heavy load-carrying.

Dog

Semi-articulated remains from four dogs were recovered from Phase 4.2: one neck from Property BW 4, one skull from Property BW 5 and one articulated hind foot from Property BE 4, which displayed exostoses on metatarsal 4 and 5, probably connected to a healed mid-shaft fracture. Since they were found in different properties, it is unlikely that they come from the same dog. A further five disarticulated dog bones were also found in this phase.

Cat

There were fourteen disarticulated bones from both adult and sub-adult cats, all from Phase 4.2. Interestingly, one humerus has a cut mark anteriorly mid-shaft. This butchery pattern most likely indicates the utilisation of cat for meat. Cat meat was not considered part of the normal Saxon diet, but could be eaten during desperate times, such as long sieges or starvation periods. Another possibility is the use of cat meat for medicinal/magical purposes (Doll 2003, 267).

Wild mammals

The scarcity of wild mammals is consistent with other late Saxon sites in Britain (Sykes 2006b, 164).

Deer

Red deer and roe deer were identified in the assemblage, along with three unspeciated antler fragments and three limb bone fragments. Since fallow deer is unlikely to be present in the vicinity of late Saxon Winchester (see above), it is probable that the unidentified deer fragments are from red deer. The red deer remains consisted of antler and non-meat bearing lower leg bones. The roe deer remains consisted of a neck vertebra and two bones from the shoulder. Three antler fragments, one of red deer (Phase 4.2) and two of unidentified deer (Phase 4.1 and 4.2), were sawn off, which strongly suggests antler working. Until the late 18th century, sawing only occurred for bone working, not butchery (MacGregor 1985, 55).

Hare

The three hare bones were recovered from three different properties (BE 1, BE 5 and BW 4). All bones are long bones, which would suggest that they represent kitchen waste. Juvenile, sub-adult and adult hares were identified.

Mustelids

Mustelids (ie badger, otter, stoat, polecat, weasel, pine marten and stone marten) are generally rare in the archaeological record and when they occur it is usually in small numbers. Eva Fairnell's (2003) survey of fur animal bones on archaeological sites in Britain yielded 43 records for badger and 10 for pine marten. Despite mustelid fur having been utilised since the Palaeolithic, actual evidence for skinning is rare: in the survey only two badger and two pine marten bones show cut marks indicating skinning (ibid., 36–41).

A badger humerus in Property BE 4 displayed horizontal cut marks supradistally on the anterior and lateral sides, such as would be found after disarticulation of the elbow joint. Historically, badgers have occasionally been utilised for meat and fat

(Griffiths 1993, 341; Neal and Cheeseman 1996, 221). It has been estimated that in autumn, approximately 30% of the badger's body weight is fat (During 1986, 141). Archaeological examples of badger bones with cut marks indicating dismemberment include bones from a Roman fort and 17th century deposits at Carrick Castle (Harman 1993, 232; Thomas 1998, 987).

Comparison of a mustelid metatarsal from Property BE 5 with modern comparatives in both the Oxford Archaeology and the English Heritage reference collections established that the Winchester metatarsal is larger than a male Welsh ferret and a male polecat, but smaller than a male Scandinavian pine marten. As a result, it has been tentatively identified as a female pine marten. Deposits of mustelid metapodials and phalanges, combined with an absence of other skeletal elements, usually are considered an indication of fur processing (Fairnell 2003, 10-11).

Birds

Domestic fowl was the most common bird in both Phase 4.1 and 4.2, comprising over 90% of the identified avian remains. While most recovered bones were long bones, pelves and sterna, it is likely that entire carcasses were disposed of. Spurs occurred on three tarsometatarsals. Another tarsometatarsal displayed woven bone growth where the spur should have been, probably a reaction to the removal of a spur. Spur removal seem to have had two purposes: either for castration, or to facilitate tied-on metal spurs on fighting cocks (West 1982). Medullary bone was present in seven long bones, indicating egg-laying hens.

The fowl remains also contained two articulated adult skeletons (including one hen), both from pit CC2225, Phase 4.2. Cut marks were absent, which suggests they may have been diseased or died of natural causes and subsequently were judged unfit for consumption. Pathological conditions were recorded on 19 of their bones: full details are available in *Digital Section 11*.

Butchery marks on fowl bones consisted of knife cuts from filleting and disarticulation, and were mostly midshaft and at the joints of longbones. A goose radius and ulna displayed cut marks at the joints, associated with disarticulation. A cooked bird is rather easy to disarticulate without tools, which may explain the relative scarcity of butchery marks on bird bones in archaeological assemblages.

Mallard and teal were the only identified duck species. As domestic ducks were bred from mallards, some of these ducks may have been domestic, although Albarella argues that domestic ducks were very rare in England until the late medieval period (Albarella 2005, 255–6). Most parts of the duck skeleton are present, which suggests that they represent remains of meals. Butchering marks from disarticulation occurred on three bones.

The other birds include goose, woodcock and kittiwake as well as unidentified passerine. Seabirds have been eaten in historical times in communities around the North Sea (Serjeantson 1988), but kittiwake is an unusual find for an inland site. Birds from late Saxon contexts not phased to either Phase 4.1 and Phase 4.2 include teal (one carpometacarpus), lapwing (two coracoids), woodcock (two humeri, one ulna), unidentified wader (one humerus, two tarsometatarsi) and blackbird-sized passerine (one humerus, one tarsometatarsus).

The Anglo-Norman assemblage

The recorded Anglo-Norman assemblage comprises 25187 bone fragments, of which 6525 (25.9%) were determined to taxon (Table 8.1). Sheep/goat is the most common animal in the assemblage, regardless of method used (Table 8.5). Similar NISP proportions have been recorded for Winchester's western suburban assemblages (Coy 2009).

Meat providing domestic mammals

Cattle

In contrast to the late Saxon period, the tooth wear analysis of the Anglo-Norman cattle indicates almost no young animals. Regardless of the method used, the sex estimation shows a consistent predominance of female cattle. Taken together, this suggests that dairy products increased in importance in the Winchester region in this period, but there may also have been a greater focus on the use of animals for traction. Based on an analysis of 110 horncores, most belonged to 3–7 year old cattle. The slaughter pattern in the western suburbs is strongly focussed on adult or old adult cattle with a MWS of 41–45. The scarcity of younger animals is unsurprising: they would have had smaller horn cores which may have been considered less valuable as a raw material than the larger adult horn cores. It would therefore seem that there was a limited trade in surplus young adults, probably male, for meat, whereas most cattle brought into Winchester for slaughter were adult. These would have been fully grown cattle, which would have yielded milk and calves for a few years before they were fattened for the market. The draught and breeding animals were killed at a later age, when they were past their prime.

When compared to measurement data from other Anglo-Norman sites in Britain (ABMAP), the cattle bones from the site are at the upper end of the size range. The exception is the radius, although the small number of measured radii may bias the comparison.

Almost 13% of the cattle bones exhibited evidence of butchery. Fifty of these, mostly from Property SE 3, had butchery marks characteristic of horn working, where horn cores had been chopped off the skull and horn sheaths had been removed from the horn core. Skinning cut marks occurred on phalanges and around the base of horn cores. Chop marks and cut marks on atlas and axis indicate axial splitting of the carcass, head removal and filleting. Evidence of disarticulation were found at several

Table 8.5. Anglo-Norman assemblage, Phase 5: Anatomical distribution, including NISP, MNI and weight for all major mammals. *Skeletal element used for MNI is marked with an asterisk*

	Cattle	*Sheep/ goat*	*Sheep*	*Goat*	*Pig*	*Horse*	*Deer sp.*	*Red deer*	*Roe deer*	*Dog*	*Cat*	*Lago- morph*	*Hare*	*Fox*	*Small mustelid*	*Stoat*	*Ferret*	*Squirrel*
Antler							3	2										
Horn core	285	135	364	86														
Skull	86	200	77		66	14				3	6							
Mandible	104	290	19	1	60	9				3	8	1						
Loose teeth	72	220	3		59	43				2	1							
Hyoid	5	11				2												
Atlas	21	30			4	3					3							
Axis	14	19			7	5				1	2							
Vertebrae						7					76							
Ribs		1									90							
Sternum											1							
Sacrum	4					4					2							
Scapula	52	90			42	5	1			1	10		1					
Humerus	74	95		1	51	2	1			1	19							
Radius	68	182			36	3			1	5*	12		1					3
Ulna	47	61			51	2				1	9		1					
Carpals	7	5			4						1							
Metacarpal	88	155	62	1	53	1		1	3*		43				3	3	6	18
Pelvis	90	133			43	7				1	12		1					1
Femur	60	58			30	8*				3	22*							
Patella	5																	
Tibia	67	204			53*	2	2*	1	1	1	21		1					3
Fibula					23						15							
Calcaneus	38	18			13						3							2
Astragalus	27	12			2	1					2							2
Tarsals	10	10			3						3							
Metatarsal	94*	181*	66	2	49	4				1	53			1		3	3	49*
Phalanx 1	49	64			18	3					29		1					100
Phalanx 2	13	31			18	1					20							75
Phalanx 3	21	12			14	3					17			7				
Indet. Phalanx		1																
Lateral metapodial					10	3												
Indet. metapodial	8	24	4		8						16							55
Sesamoid	10					1												
Indet. lateral phalanx		2			2													
Carpal/tarsal											2							
Long bone																		
Indeterminate																		
Total (NISP)	1419	2248	595	91	719	133	7	4	5	23	498	1	6	8	3	6	9	308
MNI	31	88			28	5	2	1	1	3	11		1	1		1	1	11
Weight (g)	69777	21820	23723	3173	9803	7792	526	291	99	119	391	4	14	< 0	< 0	< 0	< 0	< 0

limb bone joints and on the mandible. Occasionally, disarticulation at the joints had been carried out by chopping. One femur had been chopped in two at mid-shaft, for portioning or to extract the marrow. Two humeri, three radii and ten metapodials had been split axially, presumably for marrow extraction. Fine cut marks, mostly related to filleting, were found on a number of bones including the mandible, hyoid, scapula, humerus and pelvis.

Several cattle bones displayed pathological conditions, the majority of which were connected to infections or joint disorders; some are linked to the use of cattle for traction.

Sheep/goat

Of the 2934 sheep/goat bones, 595 could be identified as sheep and 91 as goat. Most of the goat fragments were horn cores and were largely from deposits interpreted as horn/bone working waste dumps. A predominance of goat horn cores over post-cranial elements has been observed on many British and European sites and may to some extent be caused by identification bias, since horn cores are very easy to speciate. It has been argued that the over-representation of goat horn cores could be due to goat skins being imported with the horn cores attached (see below). However, post-cranial goat remains are rarely found in large quantities, and the origin of these hypothetical skins remains unknown (Albarella 2003, 80–1).

The fusion data suggest that the sheep/goats were primarily slaughtered as sub-adults or adults. However, while only eight bones in the early fusing category were unfused, over 240 bones show surface porosity, indicating they were foetal or neonatal at the time of death. The foetal/neonatal bones are present at almost every Anglo-Norman property. However, over a third of those identified were associated with Property SE 3. This area was known as Snidelingsestret, or Snitherlingastret—The Tailor's street, in the Anglo-Saxon period (S Teague pers. comm.) and the property has been interpreted as a furrier's workshop (see discussion below). In addition to squirrel, lamb skin, so-called budge, may also have been prepared there. Almost half of the foetal/neonatal remains are metapodials, suggesting that they may have arrived at the property as part of uncured skins (cf Serjeantson 1989).

The mandibular age estimation shows that half of the Anglo-Norman caprines were slaughtered at 2–4 years of age; few very young mandibles were retrieved. This slaughter age pattern is consistent with that from the western suburbs and suggests that the local sheep husbandry had a mixed strategy, rearing sheep for meat, wool and dairy products. Sheep were slaughtered at a relatively young age for meat, and the young adults of 3–4 years of age would have yielded a few wool clips and offspring before being killed. The older animals represent sheep kept for wool and breeding purposes.

Males dominated according to the sex estimation based on pelvis morphology, although horn core evidence suggests females were more frequent among the goats, and males among the sheep. A large number (179) of sheep and goat horn cores, the majority from Property SE 3, had been removed from the skull by chopping; some horn cores also showed signs of horn sheath removal. These horn cores almost certainly relate to craft working, a topic discussed further below.

Apart from horn removal, thirteen skulls had been split sagitally in order to extract the brain, which would have been eaten. Sagittal splits also occurred on atlas and axis, showing that the carcass was suspended during the butchering process. A heavy cleaver severed the skull from the rest of the carcass. Further disarticulation by cleavers took place at the scapula, distal radius, proximal and distal femur and distal tibia. Several cut marks were observed at the neck, mandible, elbow, carpal and tarsal joints, suggesting that some disarticulation was carried out by knives. Evidence of portioning was found on the pelvis (ilium) and mid-blade on the scapula. Filleting marks were recorded on scapula, radius, pelvis and tibia. Cut marks also occur on a skull and on several hyoids, suggesting removal of cheek meat as well as utilisation of the tongue. A small perforation on one scapula suggests the shoulder being hung for smoking or for ageing the meat. Several metapodials had been split longitudinally to extract the marrow. Skinning marks were found on at the metapodial joints.

The 46 sheep/goat bones that displayed pathological conditions only amounted to 1.6% of the total sheep/goat bones in the Anglo-Norman phase, suggesting that animals were generally well looked after. Congenital conditions were found primarily on the mandibles, 52 of which had an extra foramen on the buccal side, beneath the premolars.

Pig

Many pig long bones were unfused, indicating the slaughter of mostly juvenile and sub-adult animals. The mandibular age estimation displays a peak in the immature and sub-adult age groups, which equates to a preferred slaughter age of 0.5–1.5 years (Habermehl 1975, 147). Since the younger pigs are slaughtered before they were fully grown, pork production was suboptimal. A premature slaughter of young pigs could be a sign of limitations of space or fodder; it is likely that as in the late Saxon period, pigs were kept in the backyards. The piglet remains from the site are disarticulated and display no butchering marks, which makes any further interpretation difficult. Of the 26 pig mandibular canines that could be sexed, 69% were from boars.

Thirty pig bones were butchered. Paramedial and axial splitting occurred on two axis vertebrae, indicating suspension of the carcass during the butchery process. Chop marks derive mostly from portioning rather than from disarticulation. They occurred on the scapula, ulna, pelvis, femur and tibia. Knives were generally used for disarticulation: cut marks were recorded on the scapula, humerus, radius and calcaneus. Filleting cut marks were found on the atlas, scapula, humerus, pelvis, femur, tibia and metatarsal.

Nine bones exhibited pathological conditions, most of which were associated with inactive infections.

Other domestic mammals

Horse

The paucity of horse bones is expected for an intermural urban assemblage, since horses were not food animals. Judging by epiphyseal fusion and tooth wear, most horses were adult. Immature horse remains consisted of three deciduous molars and one ulna. The ulna was unfused proximally, indicating an age at death of less than 3.5 years. Horse remains in urban sites normally consists of adult or old adult horses (Rackham 1995, 173–4).

The few measurable horse bones from the site are all within the same size range as metacarpals from other Anglo-Norman sites in Britain. Withers' heights of 1.231 m and 1.372 m respectively were calculated from the metatarsal and the tibia. Butchery marks were absent, which is in line with the Church's prohibition of eating horse meat (Egardt 1962, 77–8). Horse bones with butchery marks of any kind are rare, but there are a few examples from medieval suburban Winchester, although most are associated with skinning or feet removal rather than butchering for food (Serjeantson and Smith 2009, 153).

The only pathological conditions on the horse bones are enthesophytes, indicating muscle strains (Roberts and Manchester 1999, 110). They were found on the dorsal/lateral edge of the ilium/ischium border on a pelvis and on the glenoid process on a scapula and, as for the pathologies exhibited by some of the cattle, suggest that the animals were used to pull or carry heavy loads.

Dog

The dog remains consist of one semi-articulated juvenile dog skeleton from Property BE 4 and ten disarticulated bones from a range of properties. With the exception of a neonatal radius from Property SE 1, all other dog bones were adult. Withers' heights could be calculated on two radii from dogs of small and medium size. Three of the disarticulated bones displayed pathologies. A pelvis had a healed fracture on the ischium and a radius had some exostoses at the distal joint surface. These may be due to muscle strains. A femur had an unhealed fracture on the supradistal part of the shaft, which had lead to an infection. The infection had subsequently caused large exostoses and smooth bone growth on the shaft (Plate 8.1).

Plate 8.1 Fractured dog femur (unhealed) with extensive bone growth at the fracture. Normal dog femur to the left. Anterior view

Cat

An overwhelming majority of the 498 cat bones were retrieved from Property SE 1, mostly associated with the pits NH5169 and NH5175; ten semi-articulated individuals were recovered. With the exception of one neonatal kitten, all articulated cats were *c* 8.5–11.5 months of age at death. Similarly large quantities of articulated cat skeletons in this age group have been found at several Scandinavian sites (see below). Cut marks on mandibles, skulls and paws suggest that the Scandinavian cats were utilised for their fur. The cat remains in Property SE 1 include three bones with cut marks: typical skinning cut marks were observed on the frontal bone of a skull and on the horizontal ramus of a mandible from the same individual. A femur displayed a diagonal cut mark on the anterior side, just below the (unfused) trochanter major. This type of cut mark is associated with butchery, which is unusual to find on cat bones. Although cats were normally not eaten, medieval sources mention the use of cat meat and fat for medicinal purposes (Doll 2003, 267). Butchering marks on cat bones have been recorded from Haithabu, Germany (Johansson and Hüster 1987, 40–4).

Wild mammals

The wild mammals signify craft activity as well as dietary habits. As is common for the Anglo-Norman period, game is rare outside ecclesiastical and high-status sites (Sykes 2006b, 164) and would have contributed very little to the average person's diet.

Deer

Apart from three antler fragments, the deer remains include bones from meat-rich body parts, such as shoulder and shank, and meat-poor metapodials. It has been argued that metapodials may have been included in skins sold to tanners (Serjeantson 1989) or been sold as raw material to bone workers (MacGregor 1985, 30) but it could also be argued that the metapodials were included in the portion of venison that was sold by the butchers.

Hare

The hare remains primarily derive from meat-rich parts of the front and hind limbs, which suggests they were kitchen waste. A single phalanx from Property BE 3 may signify butchery waste or furrier's waste.

Fox, mustelids and squirrel

All but two of the fox, mustelid and squirrel bones derive from pit NH5169 in Property SE 1 (Table 8.6). Due to the large concentration of bones from the lower limbs and the absence of other skeletal elements from these taxa, the bones are believed to be waste from a furrier's workshop (see discussion below). Squirrel was the most numerous of the fur animal species. This is not surprising, as squirrel fur was highly popular, and very desirable, during the Anglo-Norman period.

The mustelid remains included stoat and polecat/ferret together with three metacarpals from small mustelids of stoat/ferret size. Ferret is the domesticated form of polecat, and was used in the Middle Ages for hunting rabbits, by releasing the ferrets into the warrens in order to flush the rabbits out and be netted. As polecat and ferret can only be distinguished on the skull (Bond and O'Connor 1999, 362), speciation was not possible. The earliest written records of ferret in north-western Europe date to the early 13th century (Van Damme and Ervynck 1988, 281). Securely identified ferret bones are extremely rare archaeologically, most likely due to the limited ways of distinguish them from the native polecats (Van Damme and Ervynck 1988, 278–9).

Birds

Over 70% of the identified avian remains are domestic fowl and most parts of the skeleton are present. Unfused or fusing bones comprised 12% of the bones with fusion indicators present, indicating the killing of immature birds. Of the 36 tarso-metatarsi with the prerequisite zone intact, 11 had spurs, indicating males. On two of these, the spurs

Table 8.6. Phase 5 pit NH5169: Anatomical distribution of all fur bearing species and neonatal caprines, including NISP, MNI and weight

	Sheep/ goat (juvenile)	*Dog*	*Cat*	*Lagomorph*	*Hare*	*Fox*	*Small mustelid*	*Stoat*	*Ferret/ Polecat*	*Squirrel*	*Small mammal*
Skull	5		4								
Mandible	5		8	1							
Atlas			2								
Axis			2								
Vertebrae			45								57
Ribs			69								44
Sternum			1								1
Scapula	3		7								
Humerus	2		12								
Radius	6		9		1					3	
Ulna	3		8		1						3
Carpals			1								
Metacarpal	10		39				3	3	6	18	5
Pelvis	2		5								
Femur	4		11								
Tibia	5		13							3	1
Fibula			12								
Calcaneus			3							2	1
Astragalus			2							2	
Tarsals			3								
Metatarsal	12*	1	47					3	2	49*	
Phalanx 1			27							100	64
Phalanx 2			20							75	38
Phalanx 3			17			7					73
Indet. metapodial	1		16							55	23
Carpal/tarsal			2								7
Long bone											3
Indeterminate											3
Total (NISP)	58	1	393	1	2	7	3	6	8	307	323
MNI	5	1			1	1		1	1	11	
Weight (g)	204	< 0	240	4	2	< 0	< 0	< 0	< 0	1	18

* - where samples contained many tiny dermal denticles, teeth or scales these items have been scored as 0 or (if no other remains) 1 per sample. Only a proportion of the fine residues were sorted.

Nfi - not further identified to genus or species were sawn off or broken off, which suggests castration or cock-fighting (see above). Medullary bone, indicating egg-laying hens, occurred on seven long bones. Butchery marks are somewhat rare, occurring on 24 fowl bones. The most common form of butchery was disarticulation of tibiotarsus and tarsometatarsus. Other butchery marks consist of cut marks associated with filleting and disjointing, which were found on femora, coracoids and a scapula. Pathological conditions were found on four fowl bones.

Two duck species could be identified: mallard or domestic duck and teal. Domestic duck is on average larger than mallard (Woelfle 1967, 81) and as one humerus was particularly large it is probably from a domestic bird. Many of the duck bones were from the wing. It has been argued that a disproportionate amount of wing bones may be a natural phenomenon, due to decomposition factors, rather than human intervention (Bovy 2002). However, in this case three humeri and two ulnae display cut marks associated with disarticulation. One of the humeri also displayed cut marks on its shaft from filleting.

Most goose bones were from either greylags or domestic geese, although one carpometacarpus could be identified as the smaller Brent goose. Only one immature bone was found, which is in contrast to the fowl. This difference may relate to fowl being raised within the town, and geese outside, being driven into the town for slaughter. According to medieval sources, geese were slaughtered in May at 12–16 weeks as 'green geese' and in late autumn as 'stubble geese' (Serjeantson 2002, 42). These two groups can be difficult to detect in the archaeological material, since geese are skeletally mature at 16 weeks (ibid., 45–6). Eleven goose bones had been butchered; most cuts were from filleting and disarticulation. There was also evidence for portioning on the sternum and synsacrum.

The pigeons may have been wild or domestic. While doves were kept in continental Europe during the Roman period, it is thought that domestic dove keeping was introduced by the Normans (Hansell and Hansell 1988, 59). However, the absence of juvenile remains suggests that dovecotes were absent (Serjeantson 2006, 141). This in itself is no indication that the bones are from wild pigeon, since domestic birds kept elsewhere may also have been eaten.

A relatively large variety of wild birds were present. It is assumed that most remains are from kitchen waste. Snipe and woodcock were the only identified waders. Waders occur fairly frequently in Anglo-Norman assemblages, but only constituted a small part of the diet. Grey partridge is less common in urban sites than waders, such as woodcock. Grey partridge is associated with the elite diet, through falconry and game parks (Sykes 2004, 96–7). Its presence in Property BW 3 opens up the suggestion of higher status inhabitants, or the sale of poached birds on the urban markets. Crane is a relatively commonly occurring bird in Anglo-Norman sites, and would only become a high-status food in the later medieval period. It is present in small numbers on most sites of this date (Sykes 2004, 98).

The opportunistic and scavenging corvids are common on urban sites. Jackdaw and crow/rook are the only corvids present. While young rooks are commonly eaten, their scavenging nature makes mature corvids less appetising. Intriguingly, the jackdaw bones in pit NH5175 consist of four complete tarsometatarsi: three right and one left. A single buzzard humerus may represent utilisation of wing feathers, or merely the remains of a deliberate killing in order to protect the domestic chicken flocks.

Both medium-sized passerines (blackbird size) and small passerines (house sparrow size) are present. Passerines were common food birds in medieval and post-medieval England (Serjeantson 2001; Serjeantson 2006, 142), and despite the lack of cut marks on the bones, it would seem likely that they were eaten.

The medieval assemblage

A total of 5630 bone fragments were recorded, of which 918 (16.3%) were identified to taxon (Tables 8.1 and 8.7). The trend of sheep/goat numerical predominance, seen in the previous phases, continues in the medieval period. This is consistent with the suburban Winchester assemblages (Serjeantson and Smith 2009, 126) but is in contrast to Southampton, where the French Quarter assemblage shows a reversed pattern for cattle and sheep/goat when compared to Winchester (Bates forthcoming). The different species ratio between Winchester and Southampton probably reflects the surrounding landscape; Southampton is closer to the sea, and its nearby wetlands would thus be more suitable for cattle grazing.

The meat providing domestic mammals

Cattle

Very few cattle bones could be aged or sexed. The three ageable mandibles had teeth wear patterns indicative of adult and senile cattle, which was consistent with the age ranges derived from horn cores. Although based on a relatively small data set, the slaughter age pattern for the northern and eastern suburban sites shows that adult cattle were primarily butchered. Among the horn cores from the suburban sites, 3–7 year old cattle were slightly more common than those of 7–10 years (Serjeantson and Smith 2009). The relatively advanced age of cattle suggests that they continued to be important for dairy or traction purposes, rather than reared just for meat.

Butchery marks were present on 24 bones. Four horn cores had cut marks or chop marks at their bases, indicating removal of horn sheath for horn working. One skull had its snout chopped off, but

Table 8.7 Medieval assemblage, Phase 6: Anatomical distribution, including NISP, MNI and weight for all major mammals. Skeletal element used for MNI is marked with an asterisk

	Cattle	*Sheep/ goat*	*Sheep*	*Goat*	*Pig*	*Horse*	*Deer sp.*	*Dog*	*Cat*	*Hare*	*Squirrel*
Antler											
Horn core	10	5	16	5							
Skull	12	20	8	1	18	1					
Mandible	14	50	3		13				1		
Loose teeth	21	27	2		19	1		1			
Hyoid	1	4									
Atlas	5	1			3						
Axis	2	3			1						
Vertebrae											
Ribs											
Sternum											
Sacrum	1										
Scapula	18*	14			10			1	1		
Humerus	8	21			9*			1		2	
Radius	18	36			7	1				3	
Ulna	8	14			9					1	
Carpals	3	3									
Metacarpal	11	29	8		11	1					
Carpometacarpus											
Pelvis	13	24			11				1		
Femur	12	11			5	1			3*		
Patella											
Tibia	9	50*			12				1		
Fibula					1						
Calcaneus	11	7									
Astragalus	6	5			2					1	
Tarsals					1						
Metatarsal	20	25	8		10		2				1
Phalanx 1	14	2			4					1	
Phalanx 2	3	2			2						
Phalanx 3	3	2			3					1	
Indet. Phalanx											
Lateral metapodial					1						
Indet. metapodial		3			3						
Sesamoid											
Carpal/tarsal											
Long bone											
Indeterminate											
Total (NISP)	223	358	45	6	155	6	2	3	7	9	1
MNI	10	20			6	1		1	2	1	1
Weight (g)	9849	3937	1256	129	2364	791	104	27	17	15	< 0

otherwise the skulls and mandibles displayed no butchering marks. Two atlas vertebrae showed signs of sagittal splitting as well as disarticulation from the skull. Sagittal splitting of the axial skeleton is generally considered a sign of suspension of the carcass during the butchery process (O'Connor 1982, 16). Knives were used for most of the disarticulation. Cut marks were observed on calcaneus, distal humerus, proximal radius and proximal metapodials. Evidence of portioning of the carcass was only found on three scapulae, which had been split through the glenoid surface. One metatarsal had been split longitudinally, most likely in order to extract the marrow. Pathological conditions occurred on six cattle bones.

Sheep/goat

Of the 409 sheep/goat bones, 45 were identified as sheep and six to goat. The goat fragments are all horn cores, three of which display butchering marks indicating horn working, so most of the sheep/goat bones are probably from sheep.

The mandibular tooth wear data show three peaks for age at death: at 2–6 months, at 2–3 years and then at 4–6 years, although the number of ageable mandibles is low: the three peaks only comprise 7, 7 and 5 mandibles each. The sheep assemblage from the northern and eastern suburbs show a single peak of 4–6 year old sheep which is in line with the focus on wool production that took place during the middle ages. However, the Northgate House/Discovery Centre assemblage is by no means unique in displaying a wide range of slaughter ages: on a countrywide basis, most sheep in both rural and urban settlements were slaughtered at a range of ages between 1 and 6 years, representing animals killed when they had just reached full size, presumably for meat, with others retained until they had produced a few clips of wool, lambs and possibly also milk.

When viewing the assemblage as a whole, male sheep/goats dominated. While the pelves showed similar proportions of males and females, the horn cores were mostly from male animals. This discrepancy between the two sexing methods is probably due to the presence of hornless ewes. Interestingly, there are no horned ewes depicted in medieval English manuscript illuminations (Armitage and Goodall 1977).

Butchery marks occurred on 38 sheep/goat bones. Chopped off sheep and goat horn cores, probably for use in horn working, were recovered from four different properties (BE 2, BE 4, BW 2 and BW 5) but the bone assemblage provides no evidence for large-scale horn working in this period. Cut marks indicative of skinning were only found on a sheep/goat first phalanx, while cut marks on the proximal ends of two metapodials may have resulted from either skinning or disarticulation. One sheep/goat axis and 15 vertebrae from medium mammals (probably sheep/goat) had been split axially, which is considered typical of the practice of suspending the carcass while butchering. Paramedial and sagittal splitting occurred in almost equal numbers. Disarticulation of limb bones took place at the joints of long bones and mandibles, by using heavy cleavers. Cut marks at joints, suggesting disarticulation using knives, were observed on mandible, calcaneus, distal humerus, proximal radius and proximal metapodials. Filleting cut marks were found on the hyoid, radius and tibia. An ilium being severed from the rest of the pelvis was the only indication of portioning in the assemblage. Two metapodials and one radius had been split longitudinally in order to extract marrow.

Pathological conditions were observed only on horn cores and metapodials. Twelve sheep/goat mandibles displayed an extra foramen on the buccal side of the horizontal ramus. This non-metric trait has been used to distinguish sheep and goats (Halstead and Collins 2002, 548–9).

Pig

Only a few pig bones could be aged and the results are is consistent with previous periods at the site: most pigs are immature or sub-adult at death and few bones belong to pigs older than 3.5 years. All mandibular canines recovered were male, although, considering the small number of sexable teeth at the site this result must be viewed with caution.

Butchery marks on pig bones primarily consisted of disarticulating cut marks which occurred on three distal humeri and on the neck region of two skulls; one metatarsal had been disarticulated by chopping through the proximal joint. Cut marks on a scapula neck suggest filleting or disarticulation while a pelvis, a mandible and a skull had been chopped through, the latter suggesting extraction of the brain.

Other domestic mammals

Horse

Only five horse bones were retrieved from the medieval phase. Judging by the surface structure, all were adult. One skull had a canine, suggesting it was male. This is, however, not a secure sex determination, as mares with canines occur occasionally (Habermehl 1975, 54; Pieper *et al*. 1995, 135). Due to fragmentation, no bones could be measured. Butchering marks and pathologies were absent. The anterior part of a metacarpal was flattened and smooth, suggesting it was used as a skate (see below and Cool, Chapter 7)

Dog

Only three adult dog bones were recovered. A withers' height of 0.35 m was calculated from measurement of one humerus.

Cat

A small number of cat bones were found in four different properties. Juvenile, sub-adult and adult cats were present and none of the bones displayed cut marks.

Wild mammals

Deer, hare and squirrel were identified. The deer remains comprised two metatarsals from either red or fallow deer which may have been transported to the site as part of a deer hide, although venison may have been eaten. The hare bones were from the front limb and the paws. A single squirrel metatarsal in Property BE 4 may indicate that a small amount of furrier activity took place at the site; this property also contained a few cattle and sheep/goat horn cores. It is not clear whether this indicates a diversification of the craft activity at the property, or whether the squirrel bone is an accidental inclusion. The guild structure was rather strict in the Middle Ages, specifically in terms of who was allowed to carry out which tasks within a craft (Shaw 1996, 116–7).

Birds

Domestic fowl is by far the most frequent bird, followed by goose; this pattern is common in medieval bone assemblages (Serjeantson 2006, 134). No wild geese were positively identified and all the goose remains were from adults. Geese moult twice a year, and feathers and down can then be collected. There is documentary evidence of plumers, that is people who dealt in feathers, from 15th century Winchester (Serjeantson and Smith 2009). They would have provided, among others, the large monastic community with feathers for quills and down for bedding. Three bones bear butchering marks indicating disarticulation and portioning of long bones.

Almost one fifth of the fowl remains were from juveniles, which is consistent with other contemporary Winchester sites (Serjeantson and Smith 2009) and suggests eggs were more important than meat. Butchering marks were found on three fowl bones: a coracoid, humerus and tibiotarsus, indicating portioning, filleting and disarticulation respectively.

Duck, pigeon, woodcock and snipe are represented by small numbers of bones. The duck bones are all in the mallard/domestic duck size range. The small number of duck bones is consistent with other medieval Winchester sites (Serjeantson and Smith 2009). Skeletal abnormalities suggesting infection or possibly muscle strains, were present on a tarsometatarsus, which displayed bone growths, or exostoses, on the mid-shaft as well as on the 'shaft' of the trochlea for the second metatarsal. The single adult pigeon bone in the assemblage may have been either from a wild or a domestic bird.

Worked bone and other crafts using animal remains

Four properties (BE 3, BE 4, SE 1, SE 3) from Phase 5 contained waste indicative of bone and horn workshops. Small quantities of worked bone and antler have been found all over the excavation area, in contexts dating to the Roman period and onwards. Previous excavations in Winchester have also revealed a scattered background of bone and antler work waste on almost all sites and phases. This is consistent with many contemporary sites in north-western Europe. Bone, antler and horn working do not require large structural investments and can therefore take place anywhere, in contrast to tanners, whose work requires long term planning and access to water. The larger deposits of bone and horn work waste, such as found in Properties BE 3, SE 1 and SE 3, are fairly straightforward to interpret. But what of the scattered work waste that is found in small numbers around the city? Even assuming the same level of taphonomic loss that has affected the non-worked bones, there are too few waste fragments to account for the craft being full-time occupation (Mainman and Rogers 2000, 2535–6).

Ailsa Mainman argues that the making of non-complicated products may have been sporadic activities, carried out on a household production level (Mainman 1999, 1872). An alternative view has been put forward by Kristina Ambrosiani and Axel Christophersen, who argue that comb making (and other crafts) was carried out by itinerant craftmen (Ambrosiani 1982; Christophersen 1980, 217). In the second half of the 11th century, specialist areas became more common in urban centres (Henry 2005), and *Tannerestret* (Tanner's Street) and *Flescmangerstret* (Butcher's Street) are known from the 10th century in Winchester (Biddle and Keene 1990, 245; Hagen 2002, 15 (in Sykes 2006a, 69)). The archaeological finds indicate that bone, antler and horn craftsmen did not restrict their location until later.

The larger work waste deposits that are occasionally found would probably have originated from specialised production. Depending on the finished products, this would fall into 'attached specialist production' or 'workshop production for trade'. These categories, coined by Eva Andersson (2003, 47) identify four different levels of production which should be viewed as a general trend, rather than absolute stages. Two or more categories may have existed side by side on the same street, or indeed, in the same property. The extensive urban nature of Winchester makes it highly likely that attached specialist production occurred within its walls. With the exception of squirrel (see above, Anglo-Norman period), none of the bone or antler finds show signs of high status production.

Horn working

Horn cores from cattle, sheep and goat, many of them bearing evidence of having been chopped from the skull, occurred in Property BE 3 (pit CC1268), Property BE 4 (pits CC2035, CC2043) and Property SE 3 (pit NH1598), all dating to the Anglo-Norman phase. Curiously, the very old cattle that are rather common in the whole Anglo-Norman assemblage are almost entirely absent from these deposits. Instead the cattle horn cores are mainly from 3–7 year old cattle and, in fewer numbers, from 2–3 year old cattle. All horn cores in the above-mentioned pits were short horned according to Armitage's and Clutton-Brock's (1976, 331) definition. The horn cores in the entire Anglo-Norman assemblage follow this trend, with almost 90% being short horned (n:19). One small horned and one long horned animal were also identified.

Sixteenth century artworks indicate that hides were delivered to the tanning yards with the horns and feet intact. The tanners removed feet and horns, which they would sell on to other craftsmen: one crafts' waste being another craft's raw material (Serjeantson 1989, 136–8). Sometimes large deposits of horn cores and foot bones are found in excavated tanning yards, and it has been suggested that these were disposed of because decomposition had progressed too far, and/or because no sale could be made (O'Connor pers. comm.). In Winchester, the tanners' yards were situated on what was then *Tannerestret*, and is now Lower Brook Street, in the low-lying eastern part of the town. The horn core deposits in Properties BE 3 and SE 3 are therefore more likely to indicate horn workers' yards than tanning yards.

In order to remove the horn sheath from the horn core, the horn must either be soaked or laid in the open for the soft tissues to decompose to such an extent that the horn sheath can be twisted loose (Albarella 2003, 74). The horn sheath was then heated, cut open and pressed flat. This procedure yields a flat sheet of horn, which can then be used to make objects such as lantern panes and combs (MacGregor 1985, 66–7). Slightly over half of the horn cores in Properties BE 3, BE 4 and SE 3 displayed butchering marks. The relative scarcity of marks mid-horn core and at the tip indicates that most horn sheaths were removed entirely from the horn core. Albarella (2003, 74) posits that tips were sawn or chopped off in order to facilitate the removal of the horn sheath or to use the solid tip as a raw material.

Bone and antler working

Pit NH1598 in Property SE 3 contained 589 fragments of large mammal ribs, in various stages of production. The ribs had been sawn off transversally and split down the mid-line. In many cases the inner bone surface had been smoothed and some pieces had holes for rivets drilled in the midline of the fragments. None were decorated. Such fragments were used as mounts, for example on caskets, but also as strengthening plates for double sided horn combs (MacGregor 1985, 95). Similar work waste fragments are known from several sites in north-western Europe, such as 13th–14th century Winchester western suburbs, 10th–11th century York and 11th–14th century Schleswig (Rees *et al*. 2008, 361; MacGregor *et al*. 1999, 1952–9; Ulbricht 1984, 37–8). The presence of plain fragments suggests some utilitarian purpose, possibly industrial (MacGregor *et al*. 1999, 1952).

Occasional bone and antler working took place in all phases and at most properties. The Roman finds included two fragments of chopped off antler pieces and one half-finished mount made of a large mammal rib. Mount production continued in the late Saxon phase, where 11 half-finished rib fragments were found in Property SE 3, six in Property BW 2 and one each in Properties SE 2, BE 4 and BW 5. There was no evidence for mount production in the Anglo-Norman phase. Half-finished bone objects include two spindle whorls made from cattle femoral heads (Properties BE 4, BW 4; late Saxon) and a skate made from a horse metacarpal (Property SE 1; medieval). Three Anglo-Norman sheep metapodials had holes drilled into the proximal joint surface. This procedure can be used for marrow extraction, but since it was more common to split the bones open in order to extract marrow, it is more likely that the metapodials are crude implement handles. Late Saxon and Anglo-Norman antler working took place in Properties SE 2, BW 4, BW 6 and BE 4. Most antler fragments comprised tines and offcuts of the main branch. Two antlers from the Anglo-Norman phase were shed. There is no evidence for antlers being removed from deer carcasses, although the considerable fragmentation of the antler makes it difficult to be certain.

Furrier

Pit NH5169 in Property SE 1 contained the most interesting evidence for craft activity: 745 bones of cat, fox, squirrel, ferret/polecat, stoat and unidentified small mammals were recovered (Table 8.6) The remains of fox, squirrel, polecat/ferret and stoat are exclusively from the feet and the lower legs, whereas most elements of the cat skeleton are represented. While cut marks were only observed on two individual cats, the composition of the assemblage suggests craft waste from furriers.

Furs from squirrels and mustelids formed a very extensive trade in early medieval Europe. Squirrel in particular was a high-status fur, which would have been appropriate for garments for many of Winchester's inhabitants, bearing in mind that Winchester was the capital of Wessex at the time. The grey winter fur of the European red squirrel was considered very attractive, and a large-scale long-distance trade in squirrel pelts took place from Scandinavia and Russia to Western Europe (Veale 2003, 63–5). The foot bones were often left on the fur, and were later removed by furriers at their final destination. Similar deposts of foot bones are known from the Bedern site in York (14th century), St Denis, France (12th century) and Birka, Sweden (8th–10th century) (Bond and O'Connor 1999, 365–6; L'Unité d'archéologie 2008; Wigh 2001, 121–3).

Over 95% of this deposit came from sieved samples; another indication of the importance of sieving, as well as a possible explanation of the rarity of these finds, despite the extensiveness of the medieval fur trade (cf. Veale 2003).

In contrast to squirrel, fox and mustelids, the cat remains comprised semi-articulated skeletons. While these may represent natural deaths or disposal of unwanted animals, their presence in deposits full of animal bones used for fur suggests otherwise. Deposits of large number of articulated and semi-articulated cat skeletons interpreted as remains of furrier activity have been found in Cambridge (Luff and Moreno 1995) and in several 9th–11th century Scandinavian sites, such as Birka, Odense, Lund, Viborg and Lödöse (Wigh 2001; Hatting 1990; Magnell 2006; Enghoff 2007; Vretemark 2000). In all these cases, including Winchester, the majority of the cat bones were unfused or fusing, suggesting juvenile and sub-adult animals. This is not a natural mortality curve, but has been interpreted as the deliberate slaughter of almost fully grown cats, in order to utilise their fur. This is further emphasised by the presence of cutmarks from skinning on skulls and mandibles.

Tawying, furrying or parchment making?

Pit NH5169 also contained bones from neonatal lambs/kids. Due to the lack of cut marks it is difficult to tell whether they represent the remains of meals or tawying waste. There is a slight over-representation of metapodials, which is usually seen as an indication of leatherworking waste (Serjeantson 1989). Furriers and tawyers were separate professions according to medieval guild structures. However, evidence of blurred lines between the various crafts preparing skins and hides are known from other sites, such as Northampton, where the guild structure was weak (Shaw 1996, 116–7). Since the guild system was less developed in the Anglo-Norman period, it is plausible that workshops could carry out several adjacent crafts.

A similar combination of sub-adult cat bones and neonatal/juvenile lamb bones were found in 14th century Cambridge (Luff 1996, 120) and in 11th–12th century Lund, Sweden (Magnell 2006, 24–9), possibly signifying a specialisation of furrier work. Cat and lamb skins were considered low status furs in medieval England, suitable for nuns, monks, craftsmen, servants and farmers (Newton 1980, 66–8; Veale 2003, 5). Despite the high status nature of Winchester in the Anglo-Norman period, there would have been plenty of inhabitants whose purse stretched more towards cat and lamb pelts.

Another, less likely, possibility is that the lamb remains are waste from small scale parchment production. The monasteries and court officials would have required large amounts of parchment, so there clearly was a local demand for it. To make parchment, the hides of young lambs, kids and calves were de-haired, and placed in a lime solution for a few days. They were then shaved thin, rubbed with pumice and dried on a stretch-frame (Reed 1975, 74). In order to avoid cuts in the skin, small pebbles were put at the edges of the skin and the thongs were tied around them, and elaborate structures were not needed for this process. The skins are small, and a medium-sized barrel might be enough for soaking. On the other hand, the absence of pumice stones and pebbles argues against parchment production taking place at Property SE 1 (Shaffrey pers. comm.), although pumice and pebbles may not have been recognised as significant finds during excavation.

FISH REMAINS *by Rebecca Nicholson*

This report summarises the analysis of over 10,000 fish bones identified to taxon. All tables and a fuller methodology and discussion are available in the accompanying digital report (*Digital Section 12*), and the raw data can be found in archive.

The assemblage

From over 10,000 identified bones, only 67 were retrieved by hand, a stark indication of the problems encountered when comparing bones from sites where different collection methods were used. Unsurprisingly, at Northgate House and the Discovery Centre the volumes of processed soil varied significantly between the different periods of activity, reflecting in part changes in density of occupation over time. Changes in the abundance of fish remains reflect to some degree these variations in the volumes of sieved soil (further details in *Digital Section 12*), but the overall trend is for the concentration of fish remains to increase over time. Phase 4.2 stands out as having a greater concentration of identified fish bones per litre of soil than Phase 5, but this may be due to the excellent preservation of organic materials within some of the late Saxon cess pits. The increase in fish bone concentration between Phases 4.1 and 4.2 may, however, be real since pits with mineralised fills were present throughout Phase 4. Taken together with the increasing complexity in social organisation manifest in developing towns, it is clear that while broadly speaking the late Saxon material may reflect the fish generally available to the local population, the deposits from later periods are more likely to reflect social demographics.

Using any means of quantification has inevitable limitations, and in this report only numbers of identified specimens (NISP) have been tabulated (Tables 8.8 and 8.9).

Of the few bones recovered by hand collection on site, most were, unsurprisingly, from large fish including cod, flatfishes (especially large plaice) and conger eel, the last often from fish of >1 m long. Occasional bones from bass, sea bream(s), gurnard, scad and eel were also collected, but the most significant find was a very large sturgeon scute from NH5185.

Iron Age and Roman deposits

A very small number of fish bones were recovered from these phases, perhaps not surprising given the types of deposits encountered. Those Phase 1 deposits which produced fish remains (only eleven bones, from herring, eel and flatfish) included posthole fills, subsoil layers and gully fills, none of which are promising repositories for general rubbish, and the possibility that these bones are intrusive can not be ruled out. Fish remains were found in pit fills from Phase 2, but were also found in trample layers and dumps. The fish represented most frequently, albeit by small numbers of bones, were eel and herring. Small flatfishes, mainly or exclusively from the plaice/flounder dab family Pleuronectidae, were also represented in a number of samples. Sea bream, including black sea bream, was identified in Phases 2.2 and 2.3, while salmonids were present in three Roman samples and one sample from late Roman Phase 2.4 (Dark Earth). Three of these bones were vertebrae from large fish, probably salmon while the fourth, a single tiny vertebra from context NH1739, was

Table 8.8. Numbers of identified fish remains recovered from bulk-sieved samples, by phase.

Species	*1*	*1.1*	*1.2*	*1.3*	*2.1*	*2.2*	*2.3*	*2.4*	*4*	*4.1*	*4.2*	*5*	*6*	*Total*
Elasmobranchii (elasmobranchs)									3	1	4	29	6	43
Rajidae (rays)										1	10	7	1	19
Raja clavata (thornback)									8	3	8	22	17	58
Conger conger (conger)											1	15	21	37
Anguilla anguilla (eel)		1			7		5	19	202	36	1063	230	267	1830
Clupeidae (herring family)							2	5	79	150	76	355	297	964
Clupea harengus (herring)			4	5	3		4	3	348	64	2251	2473	770	5925
Sardina pilchardus (pilchard)												3		3
Salmonidae (salmon family)					1			1	2		4	3	8	19
Salmo salar (salmon)					1		1							2
Salmo trutta (trout)									2	4	4	3	6	19
cf. *Salmo trutta*											2			2
cf. *Osmerus eperlanus* (smelt)													3	3
Esox lucius (pike)									4				3	7
Cyprinidae (carp family)									1		8	14	2	25
cf. Cyprinidae													1	1
Leuciscus leuciscus (dace)										1	5	2		8
Leuciscus/Gobio (dace/chub/gudgeon)											1			1
Rutilus rutilus (roach)													1	1
Gobio gobio (gudgeon)											2			2
Gadidae (cod family)									13		21	35	244	313
Gadus morhua (cod)											21	11	30	62
Pollachius pollachius (pollack)												1	9	10
Gadus /Merlangius (cod/whiting)											17		36	53
Merlangius merlangus (whiting)											12	12	200	224
Melanogrammus aeglefinus (haddock)												1	19	20
Molva molva (ling)												1		1
Merluccius merluccius (hake)												1		1
Trisopterus sp. (bib/poor cod/pout)												1		1
Belone belone (garfish)											1	18	48	67
Antherina presbyter (sand smelt)									1					1
Gasterosteus aculeatus (3-spined stickleback)									1	4	7			12
Triglidae (gurnard family)												1	9	10
Trigla lucerna (tub gurnard									1				6	7
Cottidae (cottid family)									3		3	4		10
Dicentrarchus labrax (sea bass)											2	1	6	9
Perca fluviatilis (perch)													1	1
Trachurus trachurus (scad)											4	5		9
cf. *Trachurus trachurus*											1			1
Sparidae (sea breams)						1			1		1	6	19	28
cf. Sparidae										1			1	2
Sparus sp. (gilthead/Couch's bream)													2	2
Pagellus boragaveo (red sea bream)													3	3
Spondyliosoma cantharus (black sea bream)							1							1 2
Mugilidae (grey mullet)												1	1	2
cf. Mugilidae									1					1
Liza sp. (thin-lipped/golden grey mullet)										1				1 2
Scombridae (mackerels)									1		8	3	2	14
cf. Scombridae									2					2
Scomber scombrus (mackerel)									3	8	66	23	26	126
Flatfishes nfi			1		1		1		6	7	33	54	18	121
Scophthalmidae (turbot/brill/megim)												3	1	4
cf. Scophthalmidae												3		3
Pleuronectidae (right-eyed flatfishes)					7			2	20	17	76	149	51	322
Pleuronectes platessa (plaice)									39	1	18	31	5	94
Platychthys flesus (flounder)											2	2		4
Limanda limanda (dab)					2						2			4
Limanda/Platychthys (dab/flounder)											1	1		2
Glyptocephalus cynoglossus (witch sole)									1					1
Hippoglossus hippoglossus (halibut)											1	2		3
Solidae (soles)									2		1		6	9
Solea solea (dover sole)												5	8	13
Unidentified	5		2	8	26	1	3	4	148	299	956	1269	6841	9562
Grand Total	5	1	7	13	48	2	17	34	893	597	4693	4800	8997	20107

Table 8.9. Numbers of hand collected fish bones, by phase

Species	*1.3*	*2.3*	*2.4*	*4*	*4.1*	*4.2*	*5*	*6*	*Total*
Accipenser sturio (sturgeon)							1		1
Raja clavata (thornback)					1				1
Anguilla anguilla (eel)							1		1
Conger conger (conger)						4	7	4	15
Gadidae (cod family)							5	2	7
Gadus morhua (cod)						1	4	4	9
Belone belone (garfish)							2		2
Triglidae (gurnards)							1		1
Dicentrarchus labrax (sea bass)							1		1
Trachurus trachurus (scad)							1		1
Sparidae (sea breams)							1		1
Scomber scombrus (mackerel)							1		1
Flatfish						1	4		5
Pleuronectidae (right-eyed flatfish)				3		2	10		15
Pleuronectes platessa (plaice)				1		2	3		6
Unidentified	1	8	1	3		10	41	7	71
Grand Total	1	8	1	7	1	20	83	17	138

probably from brown trout. While salmon, trout and eels may have come from local rivers and streams, and flounders can be found in fresh water as far up the Itchen as Winchester, the herrings and sea bream, and probably also the flatfish, must have been imported, possibly pickled, smoked or salted at least in the case of herrings, which deteriorate rapidly once caught. Cess pit sample NH554 in Phase 2.4 mainly produced bones from eel (including elver) but also included an anal pterygiophore from a small flatfish.

Late Saxon, 850–1050

Deposits from Phase 4 produced over 4800 identified bones, almost all from cess pit fills, pit fills and occupation deposits most of which were dated to the later part of this period (Phase 4.2).

Herring, followed by eel, were the most frequent fish most commonly represented both by numbers of bones and the proportion of samples containing these taxa. Herring represent around 60% and eel around 30% of the recorded assemblage in Phase 4.2. Some of these bones were concreted in cess and some were corroded and deformed in a manner consistent with chewing and passage through the gut (Jones 1986; Nicholson 1993). Considerable numbers of bones from tiny, juvenile fishes were intact, which given the aggressive nature of digestive juices indicates that these were not from cess. It would seem likely that the cess pits also incorporated some spoilt or undersized fish or possibly guts from larger fish. Smaller flatfishes (particularly plaice) mackerel and thornback ray were also relatively common, but their remains were never nearly as numerous as those from herring and eel. Gadids were rare, and generally small: cod, whiting and hake were all identified. The larger bones must have been discarded together with other general kitchen waste.

Other fish represented included garfish, scad, sea bream(s), tub gurnard, bass, grey mullet, conger eel, small cottid(s), salmonids including trout and probably salmon, pike, cyprinids including dace and gudgeon, and even 3-spined stickleback. A single vertebra was identified as sand smelt. All of the freshwater fishes were small individuals. Where eel cleithra were measureable, all came from fish of less than 400 mm, and usually between 250 and 350 mm long. Although pike can grow to over 1 m the individuals represented here were only around 300 mm or less. The cyprinids were even smaller—most were under 150 mm while the majority of the salmonid bones were from small brown trout.

Anglo-Norman, 1050–1225

Fish remains from the Anglo-Norman period in Properties BE 3–5 and BW 1–6 largely came from pit fills, but within this category pits positively identified as cess pits were rare. The assemblage was dominated by clupeids, notably herring (80% of the recorded assemblage). Eel was much less frequently recorded than in samples dating to the preceding centuries (6.5%). Gadids continued to be relatively rare and generally small, with bones from cod, whiting, haddock and hake identified. Flatfishes, particularly plaice/flounder/dab were particularly common in this period, overtaking eel by numbers of identified bones. Elasmobranchs, including rays, were again represented in many samples. Taxa represented by one or several bones were extremely similar to those identified in Phase 4 deposits.

Almost all of the identified bones from Property SE 1 came from the fills of pits within Pit Group NH8612, especially the fills of pit NH5045. Herring was again common, but sea bream(s), scad, trout, garfish, cottid(s) and cyprinid(s) were recovered in addition to mackerel, rays, flatfishes and eel. Several gadid bones were also recovered, including a fragment from a large ling dentary. Together with cod, ling were widely traded as dried stockfish in the middle ages. The presence of a dentary suggests that this fish was fresh, since stored ling would have lacked the head. Hand collected bone included head bones from large (1 m) cod, large eel (at least 700 mm), large plaice (600 mm), conger eel, gurnard, garfish and notably scute fragments from at least one large sturgeon. This scute, together with other fish bones, was recovered from NH5185, a fill of pit NH5169 from Pit Group NH8612 in Property SE 1. This property was located to the south of the archdeacon's residence, in an area known to be wealthy by and possibly part of a substantial capital tenement owned by Silvester in 1249 (Keen 1985 and Teague, pers. comm.).

Medieval, 1225–1500

Only a selection of samples from deposits assigned to the medieval period were included in this analysis, from Properties BE 1–5. Over 2000 bones were identified to at least family level. Again, most bones were recovered from pit fills. Clupeids, especially herring, were still numerically dominant (around 50% of identified bones) gadids were evidently much more common in the medieval deposits than previously, representing around 25% of bones in the sieved assemblage. Whiting, averaging around 400–450 mm was particularly common, with cod, haddock and pollack also present. Pit fill CC3276 in Property BE 5 contained a large number of whiting bones from at least nine complete fish, ranging in size from 250 mm to well over 500 mm but averaging 350–450 mm. Eel accounted for 12% of identified bones and flatfishes just 2.5%. Measurements on the cleithrum indicated eels of 350–420 mm. Elasmobranchs, garfish, conger eel, bass, tub gurnard, mackerel, grey mullet and sea bream(s) were all identified. Freshwater fish were scarce but included occasional bones from small perch, pike, trout and cyprinids including roach.

Discussion and conclusions

The fish assemblage from Northgate House and the Discovery Centre is the largest yet recorded in Winchester. Previous work has concentrated on the suburbs, while little bone has been recorded from intramural areas. The assemblage includes fish remains dating from the Iron Age to the medieval period. While marine fish were present in all periods, the increase in the concentration of fish in soil samples from the late Saxon period (Phase 4.2) onwards appears to support the model proposed by Barrett *et al*. (2004) for significant expansion of fishing in the decades either side of AD 1000, at least for herring. Gadids only really appear to form a significant part of the fish assemblage in Phase 6, and there was no clear evidence for the dried and salted stockfish which were extensively traded from the 11th century and throughout the medieval centuries. While it is not yet possible to identify preserved fish from the condition of individual bones alone, it is likely that both fresh and preserved fish were eaten regularly. Documentary records from Southampton indicate that pickled, salted and smoked (red) herrings were traded, and eel and stockfish were also sent to Winchester. The similarity in fish assemblages from the sites in Winchester and published assemblages from contemporary sites in Southampton also provides support for the suggestion that the primary source of sea fish available in Winchester, probably from the time of Roman settlement, was Southampton Water and the Solent. While freshwater fish were obviously eaten, apart from the migratory eel, their dietary significance never appears more than minor. These findings are in keeping with the results from other sites in Winchester, suggesting that a similar range of fish was eaten by many of the Winchester townsfolk, at least from the late Saxon to the mid 13th century. While sturgeon, found in Property SE 1 (Phase 5), demonstrates that some very expensive fish were available to the most affluent, there is very little else in the assemblage from these Winchester sites to suggest the high status which could be expected given the significance of Winchester throughout these periods of its history.

MARINE MOLLUSCS *by Greg Campbell*

Sea-shell must have been imported to Winchester from the coast, and at some speed, since they have a limited 'shelf-life'. Shellfish at inland sites are, therefore, good indicators of variation in long-distance transport efficiency between periods. Also, shellfish in the shell are a luxury food inland, since a better yield of protein and animal calories is achieved by consuming almost any other locally available animal (even one with little flesh), or by importing marine animals with a better proportion of flesh to waste (such as sea fish, or preserved shellfish flesh). So marine shells are not simply another component of the diet, they are the main, and usually the sole, means of studying perishable luxury imports at past inland sites.

An assemblage of approximately 21,000 marine shells was recovered from 1050 contexts, the greater part by hand, but some 3600 shells were retrieved by wet-sieving of bulk soil samples for recovery of charred plant remains by flotation. For all these 260 samples (almost all of which were of 40 litres excavated volume), shells over 10 mm were recovered by wet-sieving during the initial processing, and the fraction sized between 10 and 4 mm were examined, and retained and sorted if more than a dozen or so shell fragments were noted.

A fuller treatment of the analysis is available on the accompanying digital report (*Digital Section*

13), and in the archive. Hand-retrieved material greatly predominated over sieved shellfish. Analysis of the difference showed hand-retrieval significantly over-estimated oysters compared to other edible shellfish. It also seriously over-estimated the edible shellfish compared to the non-edible species, which are the better indicators of habitat exploited. Conclusions are therefore broad; robust comparisons and contrasts between phases or with other excavations or sites must wait for larger numbers of samples of larger volume from future excavations.

There was no convincing evidence for prehistoric marine shellfish. Convincing shellfish consumption began early in the Roman occupation (Phase 2.1), peaked in the late 3rd–mid 4th centuries (Phase 2.3), and continued into the late Roman period (Phase 2.4). Overall, the Roman level of shellfish consumption was low compared to later periods. Oysters were the most common shellfish consumed, with some mussels and periwinkles. Oystering appeared to be based on fast-growing near-shore and embayment oysters to produce large shells, with some use of cultch to ensure supply, and with negligible harvesting of reefs.

Shellfish were relatively common in the late Saxon period (Phase 4), and a wide range of species were consumed. Oysters continued to be the most common, but carpet shells were more common than cockles and mussels were less common than in Roman phases. The general Phase 4 shells were different from more closely datable shells from sub-Phases 4.1 and 4.2, possibly because 'kitchen-waste' was more often discarded on waste ground, and 'table-waste' was more often discarded or lost near habitations.

The Anglo-Norman period (Phase 5) saw the highest consumption of shellfish in this part of the town, with a very wide range of types, implying the residents' status and income had improved from the preceding phase. Mussels were as popular as they had been in Roman times. Periwinkles were very popular, so much so that they were discarded in masses; all were harvested for their large size from almost identical habitats. In the later medieval period (Phase 6), shellfish seem to have fallen off, giving the impression that the status and income of the residents had diminished. Mussels and carpet-shells became less popular, and periwinkles and cockles more popular, perhaps because of increased silting near the shore (inter-tidal mussels favour solid areas and carpet-shells favour coarse gravels, not muds).

Most oysters came from the late Saxon and medieval phases. Typical growth seemed similar to present-day oysters, making it likely that sea conditions were quite changed from the Roman period. Both natural reefs and more dispersed beds were being harvested, mainly sub-tidal beds by dredging. Dredging probably slowly depleted the reefs, moving dredging effort somewhat more towards bays and harbours. There seems to have been some intentional management of the oyster beds, such as the spreading of cultch (mainly mussel shells).

HUMAN SKELETAL REMAINS *by Helen Webb*

This report details the findings of the analysis of four Roman neonate skeletons (NH1528, NH4768, NH6176 and NH8510) and a single deposit (NH6236) of cremated bone of medieval date, excavated from Northgate House. It does not include NH1395, a single skull fragment (of about 25–35 years old) recovered from a Roman pit, and NH2426, three neonate vertebral arches, recovered from a medieval pit. These were assessed (Geber 2005) but did not warrant further analysis.

The remains were examined in accordance with standard osteological practice (Brickley and McKinley 2004). Methodological details are given in the full report available in the digital report (*Digital Section 10*) and archive.

Neonate burials

Neonate skeletons NH1528 and NH4768 were recovered from north-south orientated earth-cut graves (Table 8.10). Skeleton NH1528 was laid in a supine position, with the head to the north, and the arms and legs flexed. The head was probably facing west, with the mandible recovered from over the right shoulder. The arms were bent so that the hands lay over the pelvic area, and the right leg was flexed with the knee at a right angle. The position of the left leg was difficult to ascertain as only the lower parts of it (distal femur, tibia and fibula) were present, probably due to post-mortem disturbance. The grave itself was closely associated with a mid 3rd to mid 4th century (Phase 2.3) building

Table 8.10 Archaeological and osteological inventory of the four neonate skeletons and cremated bone NH6236

Skeleton No.	*Context*	*Date*	*Preservation*	*Completeness*	*Age*	*Pathology*
NH1528	Grave	Mid 2nd-mid 3rd C	Good	50 - 75 %	36 - 38 weeks	-
NH4768	Grave	Mid 3rd-mid 4th C	Good	>75 %	37 - 39 weeks	Endocranial lesions
NH6176	Posthole	Mid 2nd-mid 3rd C	Good	>75 %	40 - 42 weeks	-
NH8510	?Grave	Not dated	Good	50 - 75%	39 - 40 weeks	-
NH6236	Base of cesspit	11th-12th C	Good	-	Adult (>18 years)	-

(Structure NH8518). A bone fragment was radiocarbon dated to 50–176 cal AD (OxA-16713). Skeleton NH4768 was lying in a crouched position with the hands and feet close together, facing west with the head at the south end of the grave. The grave of NH4768 was immediately adjacent to, or possibly even within, timber Structure NH8521, dated to the mid 3rd to mid 4th century (Phase 2.3).

Skeleton NH6176 was not identified on site as a burial; the bones were recovered post-excavation during sieving of the fill from a posthole adjacent to a Roman timber Structure NH8520, dated to the mid 3rd to mid 4th century (Phase 2.3). Skeleton NH8510 was not identified during the excavation and was originally assigned the same context number as NH4768, although the exact location of this burial remains unclear.

All skeletons were fairly complete (50-75% or >75%), with low to medium fragmentation, indicating limited or no post depositional disturbance. They ranged in age from between 37–39 weeks old to 40–42 weeks old (see Table 8.10). In a modern clinical setting, full term is calculated to be about 40 weeks (280 days/10 lunar months) (Scheuer and Black 2000, 6), so whilst skeleton NH6176 and probably NH8510 may have been born at full term, or *possibly* overdue in the case of NH6176, it would appear that skeletons NH1528 and NH4768 may have been born up to four and three weeks prematurely (respectively). It was not possible to say whether any of these skeletons represent live or still births.

Neonate NH4768 displayed areas of new bone growth on the endocranial surface of the occipital bone. Porous, woven bone was present on the cruciform eminence and along the occipital (sagittal) sulcus. A study of endocranial lesions in non-adult skeletons by Lewis (2004), found that in individuals under six months of age, all cases (in her study) of endocranial lesions were porous or immature new bone lesions, and most (82%) occurred on the cruciate eminence of the occipital bone, as was the case here (ibid., 91–93). It is also suggested, however, that many of the lesions in such young individuals (0–0.5 years) were probably non-pathological in origin, and the result of the normal rapid bone growth in that part of the skeleton (ibid., 94). That being said, intra-cranial haemorrhage, as a result of mineral deficiency during a rapid growth period, can occur in preterm infants (Seow 1992, cited in Lewis 2004, 94), and indeed, the age estimate of skeleton NH4768 was 37–39 weeks.

The fact that the three Roman burials were recovered from contexts associated with structures is typical of this period when infants were rarely buried in formal adult cemeteries (Philpott 1991, 97; Esmonde Cleary 2000, 133). The practice of infant burial in association with buildings may have been more common at rural and small town sites, although it is also frequently found in major urban centres (Philpott 1991, 97).

Cremated bone

The cremated bone (NH6236) was recovered from the basal deposit of an 11th–12th century (Phase 5) cesspit, found during environmental processing (Table 8.10). It comprised a total weight of 74.4 g. At least one adult was present; there were no fragments of bone indicative of a more precise age or sex and no pathology was noted. The fragments were predominantly buff/white in colour, indicating that oxidation had taken place, but there were also occasional light bluish grey fragments (< 5%), indicative of incomplete oxidation. The majority of fragments were less than 10 mm in size, with the majority measuring 2–5 mm. The maximum fragment size was 22 mm by 11 mm. In general the bone was in good condition. Fragments of trabecular bone were present, as were occasional fragments of articular surface. Most parts of the body were represented, including the skull, the long bones of the arms and legs, ribs and pelvis. Two teeth were represented, a mandibular premolar and the roots of a molar.

CHARRED AND MINERALISED PLANT REMAINS *by Wendy Carruthers*

The 140 samples discussed in this report (Table 8.11) were selected following assessments of 357 flots. Pits producing frequent charred and mineralised plant macrofossils were abundant at Northgate House and the Discovery Centre and as widespread a sampling regime as possible was adopted so as to overcome the problems of 'patchy data' highlighted by Frank Green (cited in Serjeantson and Rees 2009).

Methods

Samples were processed using standard methods of floatation in a Siraf-type tank. Meshes of 500 microns were used to retain the residues and flots. Further methodological details, together with the full discussion of results are provided in the digital report (*Digital Section 15*) and archive.

Notes on preservation

Charred plant remains were variable in their state of preservation, with soil layers such as the Phase 1.3 'subsoil' and Phase 2.4 Dark Earth producing a higher percentage of unidentified grain, as might be expected for a ploughsoil.

The sites examined for this report were typical of many sites in Winchester in producing plant remains that were preserved both by charring and mineralisation. Concentrated cess was obvious in many of the late Saxon features, since amber-coloured seeds, arthropod remains and fine bran fragments were visible in the flots. In addition, residues were large and large clinker-like concretions—some with matted straw, bran fragments and seed impressions—could be seen in the best preserved deposits (eg Plate 8.2). Apart from 19 samples specifically examined for mineralised remains, a few other features (eg CC2177, NH2619, NH2134, NH2237) contained reasonable quantities of material but these were not analysed in detail.

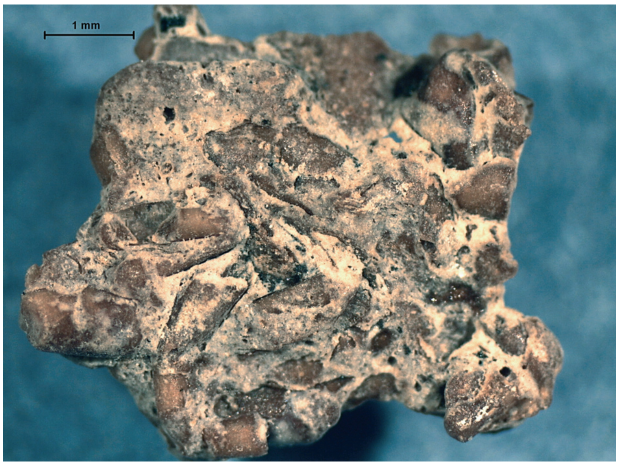

Plate 8.2 Concreted bran fragments

Period summaries and comparisons with contemporary sites in the area

Pre-Roman (Phase 1)

Charred plant remains were frequent (average density = 7.8 fragments per litre of soil processed (fpl) for Phases 1.1 and 1.2) and reasonably well preserved. The general character of the whole Phase 1 assemblage was one of burnt domestic waste, most of which probably derived from the piecemeal processing of hulled wheats (primarily spelt but with some emmer) and hulled barley over domestic hearths (see Fig. 8.1). Barley may have been more important in Phase 1.1, or the differences seen between roundhouses NH8508 and NH8502 could indicate different uses, eg. stock rearing versus human habitation. Bread-type wheat, oats, Celtic beans and black mustard may have been more important than their charred record suggests (although it is possible that some of the bread-type wheat at least was intrusive). This is because they do not need to come into contact with heat during their initial processing, although drying prior to grinding, storage or oil extraction would involve contact with fire.

Wild foods were being gathered from woodland margins and hedgerows, including hazelnuts and sloes. The range of weed seeds was typical of an Iron Age charred cereal assemblage, including indicators of winter sowing such as cleavers (*Galium aparine*), some indicators of nutrient-rich soils (eg henbane (*Hyoscyamus niger*)) and others of nutrient-poor soils (eg small-seeded weed vetches (*Vicia*/*Lathyrus* sp.)). The fairly high rate of recovery of charred material from this phase could in part be due to contamination, although hulled wheat remains were also relatively frequent for the period. The evidence suggests that the level of arable activity on the site was fairly high, but was probably not taking place on such a scale to produce accumulations of cereal processing waste. No storage pits

Table 8.11: Numbers of samples analysed for plant remains, by phase and property
*Each * represents a sample residue sorted for mineralised remains (total sorted residues = 19 samples)*

	Pre-Roman				*Roman*		*Post-Roman Dark Earth*	*Late Saxon*			*Anglo-Norman 1050-1225*	*Medieval 1225-1550*	
Property/ phase	*1 & 1.1*	*1.2*	*1.3*	*2.1*	*2.2*	*2.3*	*2.4*	*4*	*4.1*	*4.2*	*5*	*6*	*Total/ per property*
BE1								3**					3**
BE2										2	1*		3*
BE3								1					1
BE4										7*****	2**	2*	11********
BE5											3	1	4
BW1										2			2
BW2									10	5	2		17
BW3										2	9*	3	14*
BW4									4	6*	2		12*
BW5								1	1*	4*	1		7**
BW6								1					1
SE1									1	4**	7*		12***
SE2										3		1	4
SE3								4			4		8
No property	16	7	3	3	1	11	6*						47*
Total no. samples per phase	16	7	3	3	1	11	6*	10**	16*	35*********	31*****	7*	146 (19*)

were encountered in this area of the enclosure, probably because the gravel/clay soils would not have been very suitable.

Earlier excavations within the Oram's Arbour enclosure (Biddle 2005) produced sparse charred plant assemblages dating from the Beaker period. The middle Iron Age defensive ditch and a few middle Iron Age features from Sussex Street produced small numbers of spelt wheat, hulled barley and oat remains. Apart from the absence of bread-type wheat grains, these findings fit in with the site's results. They lend some support to the suggestion that the bread-type wheat at Northgate House may be intrusive.

The presence of a concentration of black mustard seeds in posthole NH6210 (Structure NH8502) is of particular interest, as several late Bronze Age and Iron Age sites have now produced evidence for oil-seed crops such as brassicas. Campbell and Straker (2003) list a number of Bronze Age and Iron Age sites that have produced large assemblages of brassica seeds, including a large deposit recovered from an Iron Age pot sherd at Old Down Farm.

The Phase 1.3 subsoil sealing these features showed signs of being manured with burnt household waste (frequent abraded cereal grains), with the appearance of corn cockle suggesting that cultivation had taken place in the Roman period. If animal waste was also used, it may not have contained much burnt material as there was little evidence of fodder. The soil micromorphology results (see Mcphail and Crowther below) also produced evidence for cultivation, and the presence of Roman artefacts indicated that this probably continued into the Roman period (Steve Teague, pers. comm.).

Roman and Dark Earth (Phase 2)

Bread-type wheat and hulled wheat (predominantly spelt) were the main cereals being consumed, and there is evidence that spelt was being used for malting in Phase 2.1 (c AD 43–130/50) (see Fig. 8.1). Barley was still an important crop, but the recovery of a predominantly barley sample from a layer of trample, CC1762, suggests that, as in later phases, it may have been primarily used for fodder. Oats and rye were minor crops, or perhaps their use for fodder meant that they rarely became charred. Hazelnut shell was present in some samples indicating a low but common use of wild food resources. The arable weed assemblage was similar to Phase 1, but corn cockle and rye grass started to become more common, being present in low numbers in six of the fifteen samples. Chess seeds were roughly twice as frequent as in Phase 1. Perhaps large grasses such as chess and rye grass were tolerated as weeds, since they were edible and could only be eradicated by hand weeding the crop in the field. This can do more damage than good to a crop sown by broadcasting the seed.

Apart from the malting deposit, the general character of the charred assemblages was one of domestic waste, probably originating from hearths

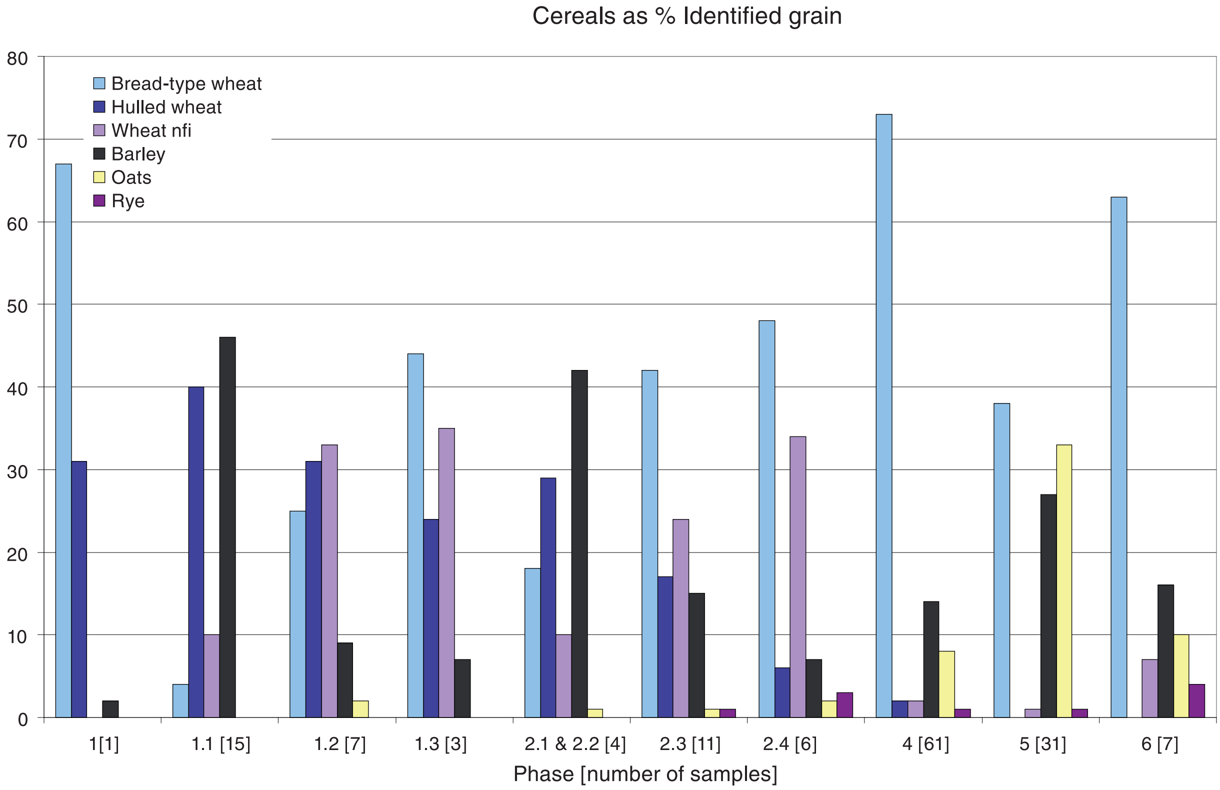

Fig. 8.1 Cereals as percentage of identified grain, by phase

over which piecemeal crop processing of hulled cereals and hand cleaning had been carried out. The large deposit of bread-type wheat in midden NH1346 (presuming contamination was not a major factor) probably represented stored grain that had been burnt to eliminate storage pests, since almost half of the grains showed signs of pest damage. The few large deposits of bread-type wheat that have been found in the Roman period in Britain have primarily been from storage contexts, such as South Shields granary (van der Veen 1994).

Charred cereal remains were frequent in the samples (average density = 14.1 fpl) suggesting that the arable economy was well-established. Although negative data should be viewed with caution (as crop processing could have removed some weed seeds), the low occurrence of leguminous weed seeds and absence of weeds of acidic or clay soils, such as sheep's sorrel and stinking chamomile, suggest that cultivation was taking place on the local, fertile calcareous soils and that the intensity was not excessive, unlike sites such as Stansted (Carruthers 2008) which showed signs of stress due to intensive cropping of spelt wheat.

Additional evidence of diet was recovered from cess pit NH4744, a small Phase 2.4 pit possibly associated with Roman Structure NH8521. Unfortunately preservation conditions were not as good as in the later phases, but mineralised remains indicated that in addition to foods made from flour (eg bread), peas and sloes or cherries were being consumed. This is very similar to the simple diet revealed in the late Saxon to medieval cess pits, being rural rather than urban in character with no evidence of imported foods (although the information was limited).

The five Dark Earth (Phase 2.4) samples produced relatively high numbers of charred cereal grains (Fig. 8.1) with some signs of erosion and fragmentation possibly due to plough damage, but perhaps not as much as might be expected if the soil had been worked for a long period. The 'lower Dark Earth' sample showed no obvious difference to the others in this respect. The charred remains appear to represent burnt domestic waste that had been used to fertilise the soil. The occurrences of the different cereals were intermediate between the Roman and late Saxon periods, with bread-type wheat being dominant and hulled wheat dropping off sharply. Although barley was not particularly frequent to indicate the use of animal waste, oats and rye were a little more frequent. Of course, most of the dung and stable waste used for manuring would probably not be burnt or contain burnt material, so it would leave few traces. The presence of a mineralised field bean hilum and a brassica seed could indicate the use of some material cleaned out of cess pits.

Late Saxon to medieval phases (Phases 4–6)

Cereals

By this period bread-type wheat was the main crop being consumed by the occupants, although barley, oats and rye were also present in varying quantities (Fig. 8.1; Table 8.12). The almost complete absence of cereal chaff fragments and very low incidence of weed seeds in the Phase 4 to 6 samples demonstrated that cereals being brought to these plots had already been fully processed. Unprocessed oats and barley may have been brought in to be used for fodder, and this would be less likely to become

Table 8.12: Distribution of major crops in different types of context during Phases 4 to 6 (charred remains only).
Numbers shown are 'numbers of samples where the crop is dominant' (but occurrence of peas/beans recorded rather than dominance).

Number of samples where charred cereal is dominant	*Phase*	*Wheat*	*Barley*	*Barley/ oats dredge*	*Oats*	*Total no. samples examined for each feature type*	*Occurrence of Charred Peas and field beans (no. of items including uncertain IDs)*
Floor/occupation layers + 'garden soil'	4	2			2	25	12
	5		3	2	3	13	8
	6	2				3	
Pits	4	13				31	15
	5	3	2		1	13	2
	6					3	
Hearths & rakeout	4				2	3	5
	5					2	
Postholes	4	2				2	1
	5	1			1	2	1
	6	1				1	

charred. However, charred assemblages containing this type of waste, including hay, oats, dredge (a barley and oats mixed crop) and cultivated vetch were recovered from many of the occupation layers, and these also produced very little chaff and weed seeds. The only sample to produce more than one or two rachis fragments was sample 214, from layer NH3240, Property BW 3 (46 wheat, barley and rye rachis fragments), and the hay meadow taxa in this sample suggested burnt fodder or dung was probably represented.

Free-threshing bread-type wheat was the principal cereal grown for human consumption by this time, and this falls from the ear when ripe so must be processed on the farm. Rye is also a free-threshing cereal, but there was only a small increase in this cereal in the Winchester samples from the Roman period onwards (Fig. 8.1), and Green (2009) noted how rare it was in samples from Winchester. It may have been purchased more often as mixed wheat/rye flour to make bread, leaving little trace in the fossil record, or it may have been eaten green in the field by livestock. Rye may have been avoided to some extent because it is very susceptible to ergot infection, and possible outbreaks of ergotism or 'St Anthony's Fire' (which can lead to abortions, convulsions and gangrene) are chronicled in the 6th and 8th centuries (Hagen 1992, 116). Barley and oats require additional stages of processing to remove the husks, which may be one reason why they were considered best suited for fodder. It is uncertain whether small amounts of hulled wheat (probably spelt) continued to be grown into the Saxon period, as has been found on some sites in southern Britain (eg late Saxon Stansted; Carruthers 2008). The fact that 39 definite and possible hulled wheat grains were found in the Phase 4 samples but only three cf. hulled wheat grains were found in the Phase 5 samples suggests that this did not represent residual material, but a crop that was being 'phased out'. Spelt is a hardy crop that produces good yields and stores well in the husk, so it may have continued to be grown for fodder by some farmsteads. If so, its presence in grain brought into town could be as occasional contaminants, or it may have been purchased to feed livestock being kept in back yards.

Whilst most cereals may have been purchased as flour and so leave traces in the mineralised cess but not charred assemblages, small amounts of cereals may have been used whole in broths and cereal pottages, or used to make groats and frumenty (Hagen 1992). Hagen (ibid., 59) mentions a range of Anglo-Saxon recipes that could well have produced the type of food remains found in many of the cess pits, such as bean soup (beonbrod), pea soup (pysena brod) and cereal pottages containing oil seeds such as flax (linseed). The remains from other foods such as carrots and mallow leaf broth are unlikely to be identifiable, although a few seeds of each taxon were found (perhaps having been used as flavourings, see below).

As indicated by the dominance of cereal bran in faecal concretions in the cess pit fills, bread was the staple food of the late Saxon and Anglo-Norman periods (Hagen 1992, 19). Hagen (ibid., 20) states that wheaten bread was considered to be far superior to other breads such as barley bread. She also notes that on special occasions such as feast days loaves were sprinkled with seeds such as poppy and fennel, both of which were recovered from cess pits in Properties BE 2, BE 4, BW 2, BW 4 and SE 1. Pit NH6138 produced abundant mineralised poppy seeds and a fennel seed. Mustard seeds (*Brassica/Sinapis* sp.), which were common in many features, may also have been used in this way or for seasoning dishes.

Comparisons of the cereal assemblages from Winchester with those from mid Saxon to medieval Southampton (Hunter 2005, Wendy Smith, pers. comm.) and late Saxon to medieval Oxford (Pelling 2006 and pers. comm.) show that scarcity of chaff and weed seeds in urban settings is a common phenomenon. Late Saxon cess pits in Oxford (Ruth Pelling pers. comm.), however, produced some samples that contained reasonable quantities of chaff and weed seeds, suggesting semi-processed grain or grain plus processing waste were being brought into the burh at this time. A sample from mid Saxon Southampton contained charred oats still enclosed in chaff (Hunter 2005, 164), suggesting that oats were being brought into Hamwic for fodder. Green (2009) gives details of two large late Saxon grain deposits from Winchester including a possible deposit of malted barley from Sussex Street and a large deposit of rye from Trafalgar House. These types of rich samples, however, are unusual and they are often the result of accidents or deliberate burning of contaminated grain. The overall picture from urban sites was that bread-type wheat (and in Oxford, rivet-type wheat) and barley were the dominant cereals being deposited as burnt waste in town, with lesser quantities of oats and rye. This was also the impression gained by Green (2009) in his study of sites in the western and northern suburbs of Winchester, with large deposits of bread-type wheat or barley sometimes being present. Barley appears to have been more frequent in Southampton in the mid and late Saxon periods, and rye may also have been a little more common, but, as Table 8.13 shows, caution must be taken when making these sorts of comparisons. Comparing the waste from different types of feature between different sites may not be valid. Green (ibid.) also points out that cereals being consumed as flour will leave little trace (or at least traces that can be identified to cereal type). Therefore, a large amount of data, together with documentary sources, must be examined before an overall, reliable picture can be obtained. If changes through the phases are to be fully understood at Winchester, not only would sufficient charred and mineralised

Table 8.13: Main economic plants by phase and property

Property / Economic Plants	*Pre-Roman 1*	*Pre-Roman 2*	*Roman*	*BE 1*	*BE 2*	*BE 3*	*BE 4*	*BE 5*
main cereal (charred)	Hulled barley, Spelt wheat	Spelt wheat, hulled barley	Spelt wheat, bread-type wheat	Bread-type wheat	Hulled barley bread-type wheat	Bread-type wheat	Bread-type wheat, hulled barley	HULLED BARLEY & OATS (DREDGE?), BREAD-TYPE WHEAT
other cereals & fodder crops (charred)	emmer wheat, oats, rye (bread-type wheat?)	Oats, (bread-type wheat?)	Hulled barley, oats, rye	Hulled barley, oats, rye	Oats, rye	Barley, oats, rye	Oats, rye, Cultivated vetch	Rye, cultivated vetch, hay?
cereal bran			+	++++	+++		++++	
pulses (pea) (bean)		[cf.B]	P	BP++++	B++		BP+++	[P]
hedgerow fruits & nuts	HNS	HNS, [cf.sloe]	HNS+	HNS++ Elderberry	HNS+++	HNS	HNS++ Blackberry Bird cherry	HNS+++, [blackberry], [hawthorn]
orchard fruits ?			Sloe/ cherry+++	Plum ++ bullace / damson/ greengage++ sloe/ cherry +++Apple+			Plum++ Sloe/ cherry+++ Apple+++ Apple/pear+++	
flavourings/ oilseeds	Brassica (cf. black mustard)+++				Brassica carrot poppy	brassica	Opium poppy	Brassica+++
fibre and possible dye plants				flax	Flax		bird cherry, blackberry,	Blackberry,
imported foods								
number of samples / mineralised samples examined	16 / 0	7 / 0	15 / 1	3 / 2	3 / 1	1 / 0	11 / 8	4 / 0

KEY : HNS = hazelnut shell fragments; B = field bean; P = pea; occasional = no symbol; several = ++; frequent = +++; abundant = ++++;
CAPITALS = some large charred cereal deposits present >100 grains; [ ] = charred pulses & fruits, all cereals charred

samples from each phase have to be examined, but also context types would have to be taken into consideration (see Table 8.12).

Pulses

In addition to bread, pulses were clearly a very important component of the diet. Peas and beans could be grown on a garden scale or as part of a crop rotation system on farmsteads. In addition to being an easily dried and stored source of protein, they can help to restore fertility to poor soils (due to nitrogen-fixing bacteria in their root nodules). Pulses can be ground into flour and added to bread, they can be added whole to soups and pottages, and they can be fed to livestock. A total of 75% of the charred pulses came from Phase 4 samples, and there were far fewer mineralised pulse remains in the Phase 5 samples than in Phase 4. The consumption of pulses, therefore, appears to have decreased from Phase 4 to Phase 5 (the Phase 6 data was too limited). It is uncertain what replaced this relatively cheap source of protein, but examples of changes in the diet at Sedgeford, Norfolk, during the medieval period cited by Woolgar *et al*. (2006, 91) showed a change from a mainly bread and dairy based diet in the 13th century to a heavily meat and fish based diet by the early 15th century. Perhaps, at this early date in Winchester, dairy products were increasing in importance and beginning to replace pulses, or maybe a wider variety of cereal based dishes were being consumed, as oats and rye became more readily available.

BW 1	*BW 2*	*BW 3*	*BW 4*	*BW 5*	*SE 1*	*SE 2*	*SE 3*
Bread-type wheat, oats	Bread-type wheat	oats	BREAD-TYPE WHEAT, oats	BREAD-TYPE WHEAT	BREAD-TYPE WHEAT	Bread-type wheat	BREAD-TYPE WHEAT
hulled barley	Hulled barley, oats	Hulled barley, bread-type wheat	Hulled barley, rye	Hulled barley, oats	Hulled barley, oats	Hulled barley, oats, rye	Hulled barley, oats, rye
			++++	++++	+++		
	[BP]	[BP]	BP ++	BP++	BP++		
HNS+++	HNS++++, elderberry	HNS++++,	HNS+++	HNS++	HNS++,	HNS++ elderberry+++	HNS++
	bullace/ damson/ greengage		[Bullace/ damson/ greengage], [sloe] ++, [apple]	Sloe/ cherry Apple, apple/pear	Sloe/ cherry, apple	Sloe/ cherry++, Apple +++, apple/pear+++	
	Poppy, brassica	brassica	Opium poppy, brassica++		Opium poppy+++ brassica		
	Flax, elderberry, cf. dyers greenweed	cf. dyers greenweed	cf. Flax	flax	Elderberry?, bryony, sloes		
				cf. fig	Grape, Fennel , cf. peach		
2 / 0	17 / 0	14 / 0	12 / 1	7 / 2	12 / 3	4 / 0	8 / 0

Comparisons with the mid Saxon cess pits at Hamwic (Carruthers 2005b; Hunter 2005) suggest that pulses were possibly even more important components of the diet earlier in the Saxon period, so perhaps the decline seen in Winchester between Phases 4 and 5 was part of a larger trend.

Using the mineralised cess pit data from Winchester as the most accurate indication of importance of pulses, therefore, of the 17 Phase 4 to 6 cesspit samples examined only the two poorest samples produced no evidence for eating pulses (BE 4-CC2120; BW 3- NH3438; both <1% faecal concretions) and these were from Phases 5 and 6. The only reasonably well preserved samples to produce low concentrations of pulse remains were SE 1-NH5175 and BE 4-CC2305, (both Phase 5, both 50% faecal concretions; 2 hilums and 3 pulse testa fragments only). Since a grape pip was recovered from a Phase 5 pit on Property SE 1, this could be another indication that the occupants enjoyed a slightly higher standard of living than the occupants of some of the other properties. Perhaps they had an alternative source of protein to pulses, such as greater quantities of meat or fish. All of the Phase 4 cess pit samples produced high or medium concentrations of pulses, suggesting that not only were pulses as much a part of the staple diet as cereal-based foods such as bread, but they were also probably being consumed all year round, even when other foods such as fresh leaf vegetables were available. Pulses were, therefore, being eaten on a daily basis either because they were cheap and 'filling', or possibly for cultural reasons.

Nuts, fruits, vegetables and flavourings

Charred hazelnut shell (HNS) fragments were remarkably frequent and widespread, particularly in samples from layers in all phases. This suggests that, rather than eating hazelnuts piecemeal around the fire and throwing the shells into the household fire (from where it became thrown into cess pits with human food waste), HNS was more closely associated with burnt animal fodder and bedding, and general waste from occupation layers. Whether this suggests that some sort of large scale drying was taking place prior to grinding the nuts into flour or storage requires further investigation. Perhaps the shells were collected over time to be used for kindling for smithing hearths and kilns. Some, but not all, of the hearth and rakeout samples examined for this report produced large numbers of HNS fragments, eg rakeout NH4226 = 482 fragments; hearth NH3782 = 777 fragments.

A few charred and frequent mineralised *Prunus* sp. (plums, cherries, sloes etc.) stones and kernels were recovered from all phases. Unfortunately because mineralisation mainly preserves soft tissues, most of the remains consisted only of the seed kernel, so identification was based on size and shape. This meant that distinction between the small round stones of cherries and sloes could not be made. Because the fruits of sloes are astringent to taste and they are rarely eaten today, it might be thought that most of the sloe/cherry kernels were from more palatable cherries. However, amongst the charred whole stones, only sloe was identified. When preserved by drying and rehydrated, the astringent taste of sloes is lost (Wiltshire 1995). Cooking can also improve flavour. Because sloes are much more likely to be growing wild in the hedgerows, being a particularly useful thorny shrub for hedging (also called blackthorn), sloes would have been much easier to gather for free, or cheaper to buy from market than cherries (which in the authors experience are heavily predated by birds). Other members of this genus are more likely to have been growing as orchard fruits, such as bullace/damson/greengage and plum. These were less common in the cess pits, but found in all three periods. Where the same fruits were found in successive phases, eg plums in Properties BE 4, Phases 4.2 and 5, it is possible that a fruit tree was growing on the plot (NB. the life of an apple tree is usually about 70–100 years).

The mineralised seeds of apples/pears are fortunately often preserved with their seed coats and on these occasions they can be identified as apple. Where seed coats were not preserved the identification had to be left at apple/pear, although no pear seeds were positively identified. It is impossible to tell from the seeds whether the apples were wild crab apples or a cultivated orchard variety. Apple pips were present in Phase 4 and 5 samples.

In view of the frequency of other possibly hedgerow fruits and nuts it is surprising that blackberry seeds were so rare. They were common in samples from the middle Saxon cess pits at Hamwic (Carruthers 2005a). No wild strawberry seeds were found, and this is another native hedgerow fruit that is often common in faecal deposits. It is unlikely that this is because of seasonal availability, since fruits can readily be preserved by boiling them down to a thickened pulp, particularly if honey is added to raise the sugar content (Hagen 1992). Also, because a reasonable number of cess pit samples was examined it is likely that cess from all seasons was represented. The absence may indicate that ungrazed open areas of scrub were not common in the vicinity of the town, or that such resources were jealously guarded by land owners.

Seeds that may have been used to add flavour to food include native plants such as mustard seed (*Brassica/Sinapis* sp.), carrot seed and poppy seed. Non-native flavourings include opium poppy, a plant that has a long history of use, dating back to the Iron Age. These seeds can also be used to provide oil, as can flax (linseed). Fennel, a herb originating in the Mediterranean, was tentatively identified in a Phase 4 cess pit fill. All of these taxa were recovered from mid Saxon Hamwic cess pits, along with several additional taxa that were not present in Winchester, such as coriander, caraway, lovage and dill. Herbs such as these could be grown in back yards as pot herbs, although fennel would probably have been bought as imported seed since it does not set seed well in the British climate.

Imported fruits and flavourings were notably scarce in the Winchester samples, presumably indicating a fairly low status. A single possible fig seed was present in a Phase 4.1 pit fill NH2451, Property BW 5. The remaining imported taxa were found in Property SE 1, with the fennel seed coming from a Phase 4.2 pit fill and the grape pip coming from a Phase 5 pit fill. A small mineralised fragment of a deeply ridged, thick walled stone, probably peach (*Prunus persica*), was recovered from pit NH6231, Phase 4.2. If this identification is correct it would be the earliest post-Roman record of peach for the British Isles. Peaches originate from China: they were grown or imported into many regions by the Romans, including Britain since it was recorded from 1st/2nd century AD New Fresh Warf, London (Willcox 1977). No early medieval records for this soft fruit exist for Great Britain to the author's knowledge. Being perishable, they would probably have been very expensive to import. Peaches can be grown in this country, but are more likely to fruit well against a wall or under glass. With increasing climatic warming that began in the 11th century AD, it is possible that peaches were successfully grown outdoors in milder parts of the British Isles such as Winchester.

Many other plants may have been consumed but they do not leave an identifiable trace in mineralised pit fills, such as leafy vegetables, leeks, onions and root vegetables. Some of the plants growing as common weeds of disturbed ground, such as fat hen and mallow, can be used as leaf vegetables. Possible wild turnip (cf. *Brassica rapa*) seeds were common in samples from all phases, and even wild plants of this species can be used as a root or a leaf vegetable (Mabey 1972, 166). Leaves from the common hedgerow herb, garlic mustard (*Alliaria petiolata*), can be used as a flavouring, as the name suggests, and has an alternative name of 'poor man's mustard'.

Possible medicinal plants

Many of the native plants present in the samples can be used for a variety of medicinal purposes, including poisonous weeds such as henbane and corn cockle. One theory as to why corn cockle was so frequent in Saxon cess pits is that the seeds can help to remove worms (Hagen 1992, 116). However, precise dosing would be important as eating them can prove fatal. Unless large concentrations of seeds occur it would be impossible to differentiate the seeds of native medicinal and vegetable plants from the seeds of ruderal weeds growing close to the features. Amongst the plants listed in old herbals such as Culpepper (1826) and Grieve (1931), the following were present as mineralised fruits/seeds and so may well have been consumed for medicinal purposes;

Opium poppy – seeds are not effective but crushed capsules were used internally and externally for pain relief
Figs – laxative
Corn cockle seed – to cure dropsy and jaundice, and remove worms (poison!)
Hemp agrimony – astringent, tonic, diuretic (roots and leaves), tanning leather
Carrot seed – carminative, stimulant and useful with flatulence
Fennel seed – carminative, for coughs, dispels fleas
Henbane seeds – antispasmodic, hypnotic, mild diuretic, mainly external use (poison!)
Black nightshade and woody nightshade seeds – externally to relive inflammation and internally as a mouthwash (poison!)
White bryony seed – emetic, tanning leather (poison!)
Fairy flax – purgative

Fibre crops and possible dyeplants

Cultivated flax seeds are commonly found in Saxon charred samples despite the fact that the oily seeds do not preserve well by charring. Both charred and mineralised seeds were recovered in small numbers in seven Phase 4 and 5 samples. These may have been a useful by-product of flax plants being grown for fibre, but no flax processing waste was found (although it is more likely to survive in waterlogged deposits). The identification of dyeplants is more problematic, as many of the edible fruits with coloured berries can be used to provide a range of colours. Several seeds were tentatively identified as *Genista* sp., a genus that includes dyers greenweed (*G. tinctoria*). Dyers greenweed is one of the dyeplants recovered from Viking York (Tomlinson 1985). All parts of the plant produce a green/yellow dye. Although many potsherds stained with madder were recovered from the plots, preservation of the root by mineralisation or charring in a recognisable form is unlikely. Unfortunately no waterlogged deposits were found; Tomlinson recovered most of her dye remains from waterlogged deposits. The following plant remains could have been used for dyeing;

Sloes, plums, elderberries – blue/black
Bird cherry – dark grey to green
Bracken – brown/green
Dyers greenweed – green/yellow
White bryony – red
Blackberry – purple
Black and woody nightshade – red

In addition to fruits and seeds, other parts of plants like the leaves of carrot and bark of apple trees could have been used. The root of white bryony, for example, produces a red dye like madder. The presence of seeds could indicate that plants were being brought onto the property for dyeing purposes. This is particularly likely for plants like white bryony, which is unlikely to be growing locally as it is a twining plant of woods and hedgerows. It may have served a dual purpose, with the berries being used medicinally and the roots being used for dyeing.

Differences in waste deposition and the occurrence of fodder crops

From Table 8.12 it can be seen that most of the large deposits of charred bread-type wheat were recovered from the Phase 4 pits, mixed in with mineralised faecal waste. These large deposits are likely to mainly represent stored grain that was deliberately burnt in order to destroy pest infestations. They may have been primarily deposited in cess pits because they were located close-by, or perhaps to ensure that the pests and diseases were well and truly buried and could not re-infect the stored crop. It is notable that all of the cess pit samples contained reasonable quantities of charred cereal remains, suggesting that this was not just a casual occasional deposit of hearth sweepings, but a more deliberate, regular activity carried out on every property. Similarly, mineralised straw and, sometimes, rush fragments were present in every cess pit. In some cases concretions of matted straw were present. It is likely that these remains represent material swept up from floors, into which charred grain was mixed, having been burnt during preparations for cooking. No charred grain was observed concreted in with the straw, however, so perhaps the deposition of separate hearth sweepings and floor sweepings was more common. Charred material and straw would have been thrown into cess pits in order to reduce smells and soak up liquids. Straw and rushes may also have been used for toilet paper. Occasional moss fragments were mineralised, but not sufficient to suggest it had been regularly used as toilet paper, as has been found in some medieval cess pits (Greig 1981).

The Phase 5 cereal assemblages were more varied in composition and fewer large deposits of bread-type wheat were recovered. This could suggest that storage conditions had improved over time, since fewer large deposits of stored grain were being destroyed. Alternatively it could indicate a wider range of cereals were being eaten by humans, or a different type of waste was being thrown into the cess pits. Most of the deposits of oats, barley and dredge present in samples from layers appear to represent fodder and stable waste, since they are mixed with hay grown on damp meadows and cultivated vetch.

Where sufficient comparable contexts have been examined, eg Phases 4 and 5 pits and layers, changes can be seen as follows. In Phase 4 oats were the main fodder crop being spread around the layers as waste, whilst in Phase 5 a wider variety of fodder crops were being used, including barley, barley/oat dredge, oats and cultivated vetch. Of the four samples to produce confirmed cultivated vetch seeds, all were from Phase 5 (2 pits, 2 layers), so it appears that this fodder crop (which has been eaten by humans in times of famine) was introduced in the Anglo-Norman period. No clear conclusions can be drawn for Phase 6 because too few samples were suitable, but there may have been a reduction in keeping livestock in the town, since fewer fodder-type deposits were found. Bread-type wheat was much more dominant, although there was a small increase in rye.

Charred pulses were also commonly present in samples from layers and it is possible that some peas and beans were used to feed livestock being kept in back yards.

Arable crop quality over time and corn cockle contamination

The late Saxon to Anglo-Norman arable fields must have been a riot of colour, with weeds such as corn cockle (large dark pink flowers), stinking chamomile (white, daisy-like flowers) and corn marigold (yellow) growing as major crop contaminants. Corn cockle in particular was rife throughout Phases 4 and 5, despite the fact that these large, black seeds could easily be picked out of the flour prior to milling. Clearly, where cereals were purchased already ground into flour, quality control was more difficult, although the fragments of black seed coats of corn cockle can be spotted amongst the flour if contamination is particularly bad.

Corn cockle seeds can have deleterious effects on people and livestock if present in high numbers, because they have a high saponin content. Wilson (1975) mentions a figure of > 0.5% in bread or gruel causing ill effects. Silverside (1977) suggests that crop rotations involving root crops could help to eradicate this harmful weed, because it cannot lie dormant for long periods and its germination is suppressed by root crops. Therefore, changes to the crop rotation system later in the medieval period may be at least part of the reason why later medieval sites usually produce fewer charred seeds than were found in these samples.

It is difficult to compare Phases 4 and 5 with Phase 6 as only one mineralised sample and seven charred samples were examined from the latest phase. One Phase 5 cess pit, NH3438 on Property BW 3, contained abundant mineralised whole corn cockle seeds but no evidence of impressions. It is possible that this household was careful to remove contaminants prior to milling, although bran-rich faecal concretions were also rare in this deposit, so the pit may have contained another type of waste rather than cess. Grieve (1931) notes that the seeds have been used to cure dropsy and jaundice in the past, and, as noted above, they can be used for their anti-helminthic effect. The fact remains, however, that 82 corn cockle seeds were recovered from a relatively small amount of residue, so this must indicate hand-cleaning unless medicinal use is suggested. Since many more charred and mineralised samples were examined from Phase 4 it appears that hand-cleaning was much more common in the Anglo-Norman phase than the late Saxon phase. This would improve the quality and taste of the flour and reduce the ill effects of this noxious weed.

Since corn cockle flowers are bright pink and showy, it is perhaps surprising that it became such a problem in Saxon and Anglo-Norman times, as this weed in particular would have been easy to remove in the field. It would appear that the quality of grain and flour being sold at market in towns such as Winchester was not always of a very high quality. On the other hand, impurities such as chaff were very rare in samples from Phases 4 to 6 and small-seeded weeds were low in number. Crop processing, in particular winnowing, appears to have been effective enough to have removed all but the larger, heavier weed seeds of a similar size and density to grain. Indications of crop quality from cereal grain size also suggest that the quality was generally good, with most of the wheat grains being large and plump, and the oats and barley grains being well-formed and often notably large. Variations in wheat grain shape, from very square grains to more elongated or pear-shaped grains suggest that a wide variety of land-races were being cultivated, and that grain was being brought into the town from a wide area. This suggestion is also supported by the range of soil preferences represented in the arable weed assemblage (see below).

Weed ecology

Although it is not always possible to be sure that the weed seeds present in the charred assemblage represent arable weeds (rather than another type of burnt waste) some taxa that were consistently present, and are also often found on other sites, can be useful in providing ecological information. One arable weed indicative of damp clay soils, stinking chamomile, increased significantly in the Phase 5 samples which may indicate that grain was being brought in to town from a different source during this phase, perhaps from further afield to supply the growing population. Corn chamomile is often associated with wheat, because wheat prefers heavier soils.

Corn marigold, a weed of sandy acidic soils was scarce in Phase 4 but increased from Phase 5 to Phase 6. In all cases, the samples where corn marigold seeds were present produced notably high levels of oats or rye. The sample from Phase 6 that produced the highest number of seeds (14 seeds; sample 214) was the only sample to produce rye rachis fragments, although no rye grains were recovered. These statistics confirm that oats and rye were being grown on poorer, sandy soils. It also suggests that rye may have been more common in Phase 6 than the charred plant record suggests, perhaps being used as an early bite fodder which is cut before it sets seeds.

Charred seeds from plants of wet ground and marsh, such as spike-rush and sedges (*Carex* spp.), greatly increased over time. Because these wet ground taxa can become charred either amongst hay or as arable weeds growing along field margins next to ditches, these figures are difficult to interpret. Samples that contained burnt hay such as sample 214 in Property BW 1, produced large numbers of seeds from wetland taxa. The results may reflect increased amounts of fodder including hay being burnt on the properties rather than the movement of arable onto wetter soils, or they could suggest that hay meadows were becoming damper.

Conclusions

The charred and mineralised assemblages from Winchester have helped to draw together and clarify previous evidence for agriculture and diet summarised by Green (2009). Unfortunately the pre-Roman (Phase 1) and Roman (Phase 2) assemblages were difficult to interpret because of concerns about possible contamination. Apart from the surprisingly frequent bread-type wheat found in both periods, the spelt, emmer and hulled barley frequencies were similar to many sites in southern Britain. There was evidence for malting spelt wheat in Phase 2.1.

The late Saxon (Phase 4) and Anglo-Norman (Phase 5) samples provided detailed evidence of diet, which was fairly simple in nature, based on cereals and pulses with hedgerow and orchard fruits and nuts. The trace of imported fruits and spices mainly came from Property SE 1. Several properties produced evidence to suggest that livestock was being kept in the backyards. Flax and possible dyeplant remains were present on some properties, providing evidence for craft working. Bearing in mind differences in preservation, diet in late Saxon Winchester was more similar to late Saxon Oxford than Southampton, although the cereal evidence was similar.

THE WOOD CHARCOAL *by Dana Challinor*

This report presents the results of the analysis of 20 samples. The aims of the charcoal analysis were to provide evidence for the type and character of fuelwood used, the exploitation of woodland resources and managed woodland and any temporal changes over the phases represented.

Twenty fragments from each sample were selected for identification, ten from the >4 mm fraction and ten from the >2 mm fraction. Classification and nomenclature follow Stace (1997). All of the specimens were consistent with native taxa and the taxonomic level of identification varies according to the anatomical similarity between genera. Most of those given to species level are based upon the likely provenance and period, ie where a genus is represented by a single species. Fuller details are available in the digital report (*Digital Section 16*), and in archive

Late Saxon (Phase 4.1)

Property BW 2

Two samples were examined. Context NH4712 came from a pit with metalworking evidence (kiln fragments and hammerscale) and produced an assemblage dominated by oak (*Quercus*), with a fair amount of heartwood present. A few pieces of hazel (*Corylus avellana*), including roundwood fragments were also recorded. Sample NH551, context NH4711, from the same feature was also dominated by oak, but the charcoal was more fragmented. The processes of iron smelting and smithing would both have required charcoal as fuel (Edlin 1949, 160; Cleere and Crossley 1985, 37) and oak would have provided good quality charcoal, capable of achieving the high temperatures necessary.

In contrast the burnt layer NH4556, which came from a charcoal spread related to a hearth and from probable domestic waste, produced a more mixed assemblage of oak, alder (*Alnus glutinosa*), hazel, willow/poplar (*Salix/Populus*), hawthorn group (Maloideae) and holly (*Ilex aquifolium*), indicating less focused selection of wood for fuel.

Property BW 4

An occupation layer (NH3494) with evidence of domestic burning was examined from BW 4. This sample produced a mixed assemblage, with lots of oak and hazel, and a few fragments of hawthorn group, field maple (*Acer campestre*) and ash (*Fraxinus excelsior*).

Property BW 5

A lens of charcoal in an occupation deposit at the south end of the tenement, NH2424, may represent mixed domestic and metalworking debris, since a large fragment of a smithing hearth was found in an associated deposit. The charcoal comprised mixed taxa, with oak, hazel, hawthorn group, field maple and ash. All of the hazel came from small diameter roundwood. In contrast to the smithing associated deposit in Property BW 2 (NH4712), oak was not dominant.

Late Saxon (Phase 4.2)

Property BW 2

An assemblage from occupation layer (NH4217) overlying floor surface NH4225 appeared to comprise mostly oak, but several other taxa were identified, including hazel, hawthorn group and ash. Fragments of oak and ash sapwood were noted and the hazel came from small diameter roundwood.

Property BW 4

A sample of domestic debris from an occupation layer (NH3186) associated with substantial chalk floors in BW 4 produced a mixed assemblage with beech, oak, hazel, hawthorn group, blackthorn (*Prunus spinosa*) and ash. The blackthorn and hazel came from roundwood. This was the only Saxon sample to contain beech charcoal.

Property BW 5

Context NH2377 came from one of the large sub-rectangular 'cess' pits in Pit Group NH8598. Some of these pits contained fragments of smithing hearths so the origin of the charcoal may have been from metalworking, mixed with domestic debris. The charcoal assemblage appeared to be mainly oak, including some very large fragments, with heartwood, sapwood and small branchwood represented. Three other species, mostly from roundwood, were noted—hazel, hawthorn group and field maple. The dominance of oak in this sample may relate to metalworking activities, but large oak fragments have been recovered from other Saxon cess pits, where it has been suggested that the charcoal may have been deliberately deposited to help mask odours (Gale 2005).

Property BE 2

Two samples from a probable structure in this property were from slumped floor/occupation deposits. Context CC1354 was thought to belong to layers of slumped floors (Group CC7014) over the top of pit CC1352. Scorching evidence indicates that the deposits were associated with a hearth and represent domestic activity. The sample from context CC1420 came from a similar deposit (Group CC7009) slumped over pit CC1397. The taxonomic composition of these samples was extremely similar—both produced oak, hazel, alder, hawthorn group field maple and ash, with a significant component of roundwood fragments.

Property BE 4

The two samples from BE 4 dating to Phase 4.2 derived from domestic activities associated with pits in Pit Group CC7018. Context CC2360 was directly associated with hearth debris and the assemblage contained a significant component of oak, whilst CC2290 was more mixed. Both samples contained hazel, alder, hawthorn group and ash. Context CC2360 also produced two small roundwood fragments of spindle tree (*Euonymus europaeus*) and blackthorn.

Anglo-Norman (Phase 5)

Property BW 2

Two samples (contexts NH4186 and NH4189) from Group NH8539 were from floor debris of probable hearth rake-outs, and presumably represent domestic waste. The assemblages were similar in composition, dominated by beech (*Fagus*) and containing oak, hazel and hawthorn group, including many roundwood fragments.

Property SE 1

Pit NH5192 was part of a group of postholes\small pits (Pit Group NH8612) which may have been part of a structure associated with metalworking. The sample was notable for its abundance of very large fragments of charcoal, many of which were from hazel stems. Several pieces were 12 years old, as was one of the cherry (*Prunus avium*) stems. A few fragments of oak, alder and hawthorn group were also identified.

Property SE 3

The two samples from SE 3 came from large rectangular pits, one of which was a possible cellar (NH8635) containing dumps of cess and domestic waste. The other pit (NH8636) also contained backfill layers of cess and was in addition associated with smithing waste. The assemblages were notably contrasting, with NH8635 apparently dominated by beech, and NH8636 dominated by oak. Small quantities of other, but different, species were present in both, including hazel and blackthorn in NH8635 and birch (*Betula* sp.), alder and field maple in NH8636.

Property BE 5

Contexts CC3034 and CC3083 came from pit

CC3010 which contained slumped floors interspersed with domestic occupation deposits, many with a high charcoal content indicating sweepings from hearths. Both assemblages were mixed in character; with significant components of oak and beech and a range of other species, including hazel, alder, hawthorn group and field maple.

Medieval (Phase 6)

Property SE 2

A single sample dating to this phase came from the fills of a rubbish pit (NH1005). The assemblage was primarily composed of oak and beech, with a few fragments of hazel, blackthorn and hawthorn group.

Property BE 4

Context 2092 came from an occupation deposit which was interspersed with several slumped floor layers, representing domestic debris. The assemblage contained a diverse range of taxa, with mixed hazel and alder and oak, and single fragments of willow/poplar, hawthorn group and ash.

Discussion: changes over time and supplies of firewood

On first examination, the charcoal assemblages exhibit a reasonable degree of similarity across the areas and throughout the phases represented (Fig. 8.2). This indicates some consistency in the selection of firewood and possibly methods of procuring firewood. However, there are a few significant changes over time. Firstly, and most importantly, there is an apparent rise in the use of beech (*Fagus sylvatica*). No beech charcoal was identified from the Phase 4.1 samples, and only one of the seven Phase 4.2 samples contained beech. Almost all of the later Phase 5 and 6 samples produced beech, which formed a significant component or was dominant in five of the assemblages. Oak continued to be used and was present in all of the later samples, but the rise in the use of beech wood may account for small decreases in the occurrence of taxa such as hawthorn group and hazel, and field maple.

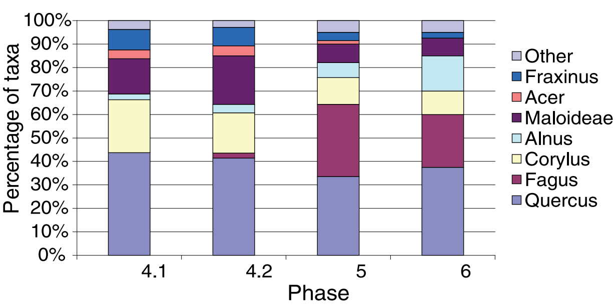

Fig. 8.2 Taxonomic composition of charcoal by phase

This shift in the charcoal record indicates a change in the source of firewood resources, or a change in the management regime. Supplies of firewood would have been provided from locally managed woodlands (Rackham 2006), and any charcoal fuel (such as required for metalworking or for odour disposal) would certainly not have travelled any great distance. It is interesting that a similar shift in the utilisation of beech is mirrored at other urban sites such as Oxford (Challinor 2002) and Southampton (Challinor forthcoming). The evidence from Southampton is particularly interesting given its proximity to Winchester, although the charcoal record is slightly later there, with beech not recorded as significant until the high medieval period, rather than the Anglo-Norman period. Changes in the local woodlands around Winchester may have preceded those around Southampton.

One final possibility should be mentioned—that the increase in beech may relate to the use of charcoal as fuel. Beech makes a good charcoal, as does alder, which also appears in greater quantity in the later samples. Whilst the evidence for smithing is not securely linked to specific buildings, there does seem to be a lot of residual evidence for it in the samples and the charcoal may have derived from it. Moreover, charcoal may have been used for other purposes, such as being deliberately deposited into cess pits to absorb odours (Gale 2005). Nonetheless, the comparable evidence from Southampton and Oxford suggests that a more widespread change may be occurring in Anglo-Norman and medieval fuel use.

ANALYSIS OF SAMPLES FOR EGGS OF INTESTINAL PARASITES AND OTHER MICROFOSSILS *by Andrew K G Jones*

The presence of ancient human faecal material in medieval deposits in Winchester was first reported by Taylor (1955) who found three kinds of intestinal parasites in well stratified peat like samples associated with a timber tank structure. The samples in the present study contrasted markedly with those described by Taylor: they varied considerably in colour, texture and moisture. None were highly organic peat like material with visible straw-like structured peats of the first Winchester find. A few resembled coprolites and on closer inspection contained inclusions, notably small splinters of large mammal bones, indicating they were canine (probably dog) droppings. The remaining soil/earth samples also varied, ranging from dark grey brown clay with low organic content, to friable very dark grey organic silt. A methodology for the concreted samples and the unconsolidated earth samples can be found in *Digital Section 14*.

The concreted samples, although most unpromising at first sight, proved to be the most productive with two samples yielding parasite ova. The presence of eight ova in context CC2177 (a Phase 4.2 pit) is convincing evidence for the presence of significant amounts of faeces, probably of human origin. The other sample (CC2010 – a Phase 4.2 pit) yielded a single trichurid ovum and while this too may be interpreted as evidence for the presence of faecal matter, low concentrations of parasite ova have relatively little interpretive value. Only one of the earth samples (NH2399 – a Phase 4.2 pit/well) produced a single trichurid ovum.

Measurements taken on ancient trichurid ova from a sample of concreted material recovered by wet sieving earth samples has provided good evidence that the worms responsible for the eggs were the human whipworm, *Trichuris trichiura*.

SOIL MICROMORPHOLOGY, CHEMISTRY AND MAGNETIC SUSCEPTIBILITY *by Richard Macphail and John Crowther with a contribution by Gill Cruise*

Selected monoliths employed in the assessment of Northgate House and the Discovery Centre were subsampled for bulk analyses (chemistry and magnetic susceptibility) and thin sections (see Tables 1 and 2 in *Digital Section 17*). In all, 17 bulk samples and 21 thin sections were analysed. Pollen assessment data also contributed to the investigation. A summary is provided here, while the full report, including all tables, thin section scans, photomicrographs and SEM-EDAX images, is provided in the archive and is available in *Digital Section 17*.

A total of 34 contexts and sub-units were identified and described and of these, 26 were specifically counted employing some 34 identified characteristics (Tables 4–5 in *Digital Section 17*).

Winchester Discovery Centre context DC3409 is clearly a middle Iron Age holloway accumulation which shows the effects of trampling, including the inclusion of dung residues. Context DC6001 records a probable pre-Roman arable soil, developed over the local natural Eb horizon of typical palaeoargillic brown earth soil (Carstens soil series). Contexts DC1356, DC1357 and DC1358 are late Saxon (Phase 4.2) domestic floor deposits (eg DC1357), and dumps/spreads rich in ash and phosphate-rich materials such as bone and coprolites, and include much burned food/kitchen waste.

Northgate House contexts NH4436/NH4393 are typical decalcifying weakly humic and biologically worked Dark Earth that originated from soil formation in ‘urban’ middens on waste(?) ground, and includes coarse resistant relict Roman material (coprolites, bone, burned daub and iron slag, for example). In contrast, the overlying late Roman Dark Earth (NH4412) records both middening (including domestic ash waste) and inputs of probable dung residues. Context NH5059 seems to have been influenced by in situ animal pounding—such ‘rural’ signatures in NH4412 and NH5059 are recorded elsewhere in late Roman deposits and Dark Earth.

The Phase 5 sequence recorded in Monolith NH226 reveals a sequence of floor and occupation deposits associated with industrial/craft activity, with very strongly burned hearth and furnace/Crucible debris indicating temperatures of 1000–1200ºC being employed, and enrichment in lead and some enrichment in copper and zinc, also being recorded. In contrast, the Phase 4.2–5 sequence sampled in Monolith NH253 found multiple floors and associated domestic/kitchen hearths; these were probably regularly renewed/reconstructed because they became eroded when ashes were raked out.

Occasionally, the balance of floor deposit sources varied from dominantly domestic kitchen hearth rakeout, to mixed deposits containing industrial and stable waste. At both NH226 and NH253, material included from outside space was recorded. A poorly preserved sample from Monolith NH559 indicates mainly domestic (kitchen hearth?) use of space. Similarly, Monolith NH187 records a pit containing intercalated cess and domestic floor sweepings.